



Processes

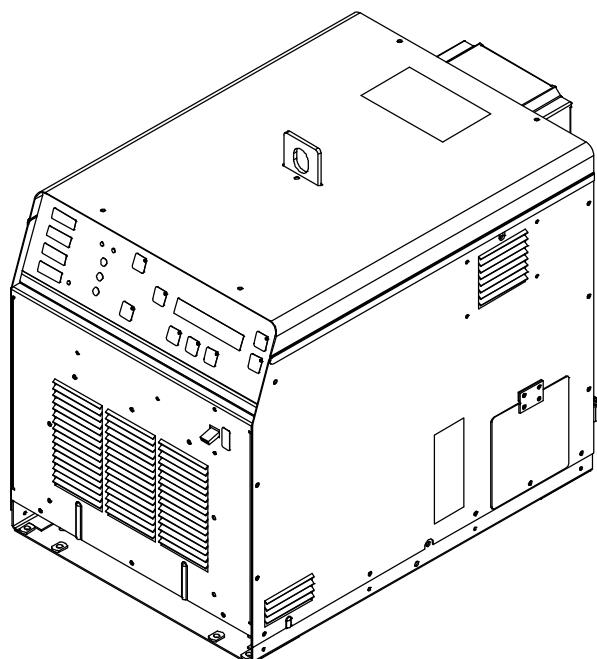
Induction Heating

Description



Induction Heating Power Source

Toccotron AC



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OWNER'S MANUAL

File: Induction Heating

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SECTION 1 – SAFETY PRECAUTIONS – READ BEFORE USING

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⚠ Protect yourself and others from injury — read and follow these precautions.

1-1. Symbol Usage

- ⚠ DANGER!** – Indicates a hazardous situation which, if not avoided, will result in death or serious injury. The possible hazards are shown in the adjoining symbols or explained in the text.
- ⚠** Indicates a hazardous situation which, if not avoided, could result in death or serious injury. The possible hazards are shown in the adjoining symbols or explained in the text.

NOTICE – Indicates statements not related to personal injury.

⚠ Indicates special instructions.



This group of symbols means Warning! Watch Out! ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.

1-2. Induction Heating Hazards

- ⚠** The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Safety Standards listed in Section 1-5. Read and follow all Safety Standards.
- ⚠** Only qualified persons should install, operate, maintain, and repair this unit.
- ⚠** During operation, keep everybody, especially children, away.



ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns. The power circuit and output bus bars or connections are electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. Incorrectly installed or improperly grounded equipment is a hazard.

- Do not touch live electrical parts.
- Enclose any connecting bus bars and coolant fittings to prevent unintentional contact.
- Wear dry, hole-free insulating gloves and body protection.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
- Additional safety precautions are required when any of the following electrically hazardous conditions are present: in damp locations or while wearing wet clothing; on metal structures such as floors, gratings, or scaffolds; when in cramped positions such as sitting, kneeling, or lying; or when there is a high risk of unavoidable or accidental contact with the workpiece or ground. For these conditions, see ANSI Z49.1 listed in Safety Standards. And, do not work alone!
- Disconnect input power before installing or servicing this equipment. Lockout/tagout input power according to OSHA 29 CFR 1910.147 (see Safety Standards).
- Use only nonconductive coolant hoses with a minimum length of 18 inches (457 mm) to provide isolation.
- Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.
- Always verify the supply ground – check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet.

- When making input connections, attach proper grounding conductor first – double-check connections.
- Keep cords dry, free of oil and grease, and protected from hot metal and sparks.
- Frequently inspect input power cord for damage or bare wiring – replace cord immediately if damaged – bare wiring can kill.
- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized, or poorly spliced cables.
- Do not drape cables over your body.
- Do not touch power circuit if you are in contact with the work, ground, or another power circuit from a different machine.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.

SIGNIFICANT DC VOLTAGE exists in inverter power sources AFTER removal of input power.

- Turn Off inverter, disconnect input power, and discharge input capacitors according to instructions in Maintenance Section before touching any internal parts.



FUMES AND GASES can be hazardous.

Induction Heating of certain materials, adhesives, and fluxes can produce fumes and gases. Breathing these fumes and gases can be hazardous to your health.

- Keep your head out of the fumes. Do not breathe the fumes.
- If inside, ventilate the area and/or use local forced ventilation to remove fumes and gases.
- If ventilation is poor, wear an approved air-supplied respirator.
- Read and understand the Material Safety Data Sheets (MSDSs) and the manufacturer's instruction for adhesives, fluxes, metals, consumables, coatings, cleaners, and degreasers.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watchperson nearby. Fumes and gases from heating can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- Do not heat in locations near degreasing, cleaning, or spraying operations. The heat can react with vapors to form highly toxic and irritating gases.
- Do not overheat coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the heated area, the area is well ventilated, and while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if overheated. See coating MSDS for temperature information.



FIRE OR EXPLOSION hazard.

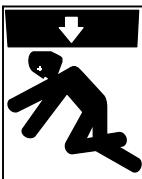
- Do not overheat parts.
- Watch for fire; keep extinguisher nearby.
- Keep flammables away from work area.
- Do not locate unit on, over, or near combustible surfaces.
- Do not install unit near flammables.
- Do not operate where the atmosphere may contain flammable dust, gas, or liquid vapors (such as gasoline).
- After completion of work, inspect area to ensure it is free of sparks, glowing embers, and flames.
- Use only correct fuses or circuit breakers. Do not oversize or bypass them.



INDUCTION HEATING can burn.

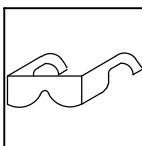
- Do not touch hot parts bare-handed.
- Allow cooling period before handling parts or equipment.
- Do not touch or handle induction head/coil during operation.
- Keep metal jewelry and other metal personal items away from head/coil during operation.
- To handle hot parts, use proper tools and/or wear heavy, insulated welding gloves and clothing to prevent burns.

1-3. Additional Symbols for Installation, Operation, and Maintenance



FALLING EQUIPMENT can injure.

- Use handle and have person of adequate physical strength lift unit.
- Move unit with hand cart or similar device.
- For units without a handle, use equipment of adequate capacity to lift and support unit.
- Keep equipment (cables and cords) away from moving vehicles when working from an aerial location.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.
- Follow the guidelines in the Applications Manual for the Revised NIOSH Lifting Equation (Publication No. 94-110) when manually lifting heavy parts or equipment.



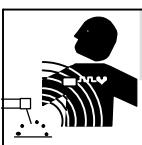
FLYING METAL OR DIRT can injure eyes.

- Wear approved safety glasses with side shields or wear face shield.



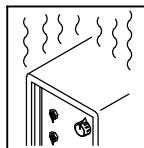
MOVING PARTS can injure.

- Keep away from moving parts such as fans.
- Keep all doors, panels, covers, and guards closed and securely in place.
- Have only qualified persons remove doors, panels, covers, or guards for maintenance and troubleshooting as necessary.
- Reinstall doors, panels, covers, or guards when maintenance is finished and before reconnecting input power.



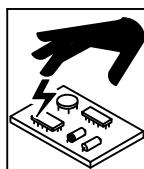
ELECTRIC AND MAGNETIC FIELDS (EMF) can affect Implanted Medical Devices.

- Wearers of Pacemakers and other Implanted Medical Devices should keep away.
- Implanted Medical Device wearers should consult their doctor and the device manufacturer before going near arc welding, spot welding, gouging, plasma arc cutting, or induction heating operations.



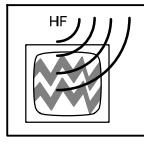
OVERUSE can cause OVERHEATING

- Allow cooling period.
- Reduce output or reduce duty cycle before starting to heat again.
- Follow rated duty cycle.



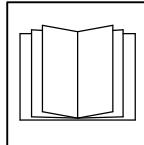
STATIC (ESD) can damage PC boards.

- Put on grounded wrist strap BEFORE handling boards or parts.
- Use proper static-proof bags and boxes to store, move, or ship PC boards.



H.F. RADIATION can cause interference.

- High-frequency (H.F.) can interfere with radio navigation, safety services, computers, and communications equipment.
- Have only qualified person familiar with electronic equipment perform this installation.
- The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- If notified by the FCC about interference, stop using the equipment at once.
- Have the installation regularly checked and maintained.
- Keep high-frequency source doors and panels tightly shut.



READ INSTRUCTIONS.

- Read and follow all labels and the Owner's Manual carefully before installing, operating, or servicing unit. Read the safety information at the beginning of the manual and in each section.
- Use only genuine replacement parts from the manufacturer.
- Perform maintenance and service according to the Owner's Manuals, industry standards, and national, state, and local codes.

1-4. California Proposition 65 Warnings

- ⚠ Welding or cutting equipment produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)
- ⚠ Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. *Wash hands after handling.*
- ⚠ This product contains chemicals, including lead, known to the state of California to cause cancer, birth defects, or other reproductive harm. *Wash hands after use.*

For Gasoline Engines:

- ⚠ Engine exhaust contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

For Diesel Engines:

- ⚠ Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

1-5. Principal Safety Standards

Safety in Welding, Cutting, and Allied Processes, ANSI Standard Z49.1, from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

Safety in Welding, Cutting, and Allied Processes, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 5060 Spectrum Way, Suite 100, Ontario, Canada L4W 5NS (phone: 800-463-6727, website: www.csa-international.org).

OSHA, Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910, Subpart Q, and Part 1926, Subpart J, from U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 (phone: 1-866-512-1800) (there are 10 OSHA Regional Offices—phone for Region 5, Chicago, is 312-353-2220, website: www.osha.gov).

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, Quincy, MA 02269 (phone: 1-800-344-3555, website: www.nfpa.org and www.sparky.org).

Canadian Electrical Code Part 1, CSA Standard C22.1, from Canadian Standards Association, Standards Sales, 5060 Spectrum Way, Suite 100, Mississauga, Ontario, Canada L4W 5NS (phone: 800-463-6727, website: www.csa-international.org).

Safe Practice For Occupational And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 25 West 43rd Street, New York, NY 10036 (phone: 212-642-4900, website: www.ansi.org).

Applications Manual for the Revised NIOSH Lifting Equation, The National Institute for Occupational Safety and Health (NIOSH), 1600 Clifton Rd, Atlanta, GA 30333 (phone: 1-800-232-4636, website: www.cdc.gov/NIOSH).

1-6. EMF Information

Electric current flowing through any conductor causes localized electric and magnetic fields (EMF). Welding current creates an EMF field around the welding circuit and welding equipment. EMF fields may interfere with some medical implants, e.g. pacemakers. Protective measures for persons wearing medical implants have to be taken. For example, access restrictions for passers-by or individual risk assessment for welders. All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:

1. Keep cables close together by twisting or taping them, or using a cable cover.
2. Do not place your body between welding cables. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.

4. Keep head and trunk as far away from the equipment in the welding circuit as possible.
5. Connect work clamp to workpiece as close to the weld as possible.
6. Do not work next to, sit or lean on the welding power source.
7. Do not weld whilst carrying the welding power source or wire feeder.

About Implanted Medical Devices:

Implanted Medical Device wearers should consult their doctor and the device manufacturer before performing or going near arc welding, spot welding, gouging, plasma arc cutting, or induction heating operations. If cleared by your doctor, then following the above procedures is recommended.

SECTION 2 – CONSIGNES DE SÉCURITÉ – LIRE AVANT UTILISATION

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⚠ Se protéger, ainsi que toute autre personne travaillant sur les lieux, contre les étincelles et le métal chaud.

2-1. Signification des symboles

- ⚠ DANGER!** – Indique une situation dangereuse qui si on l'évite pas peut donner la mort ou des blessures graves. Les dangers possibles sont montrés par les symboles joints ou sont expliqués dans le texte.
- ⚠** Indique une situation dangereuse qui si on l'évite pas peut donner la mort ou des blessures graves. Les dangers possibles sont montrés par les symboles joints ou sont expliqués dans le texte.

NOTE – Indique des déclarations pas en relation avec des blessures personnelles.

2-2. Dangers relatifs au soudage à l'arc

- ⚠** Les symboles présentés ci-après sont utilisés tout au long du présent manuel pour attirer votre attention et identifier les risques de danger. Lorsque vous voyez un symbole, soyez vigilant et suivez les directives mentionnées afin d'éviter tout danger. Les consignes de sécurité présentées ci-après ne font que résumer l'information contenue dans les normes de sécurité énumérées à la section 2-5. Veuillez lire et respecter toutes ces normes de sécurité.
- ⚠** L'installation, l'utilisation, l'entretien et les réparations ne doivent être confiés qu'à des personnes qualifiées.
- ⚠** Au cours de l'utilisation, tenir toute personne à l'écart et plus particulièrement les enfants.



UNE DÉCHARGE ÉLECTRIQUE peut entraîner la mort.

Le contact de composants électriques peut provoquer des accidents mortels ou des brûlures graves. Le circuit électrique et les barres collectrices ou les connexions de sortie sont sous tension lorsque l'appareil fonctionne. Le circuit d'alimentation et les circuits internes de la machine sont également sous tension lorsque l'alimentation est sur marche. Des équipements installés ou reliés à la borne de terre de manière incorrecte sont dangereux.

- Ne pas toucher aux pièces électriques sous tension.
- Protéger toutes les barres collectrices et les raccords de refroidissement pour éviter de les toucher par inadvertance.
- Porter des gants isolants et des vêtements de protection secs et sans trous.
- S'isoler de la pièce à couper et du sol en utilisant des housses ou des tapis assez grands afin d'éviter tout contact physique avec la pièce à couper ou le sol.
- D'autres consignes de sécurité sont nécessaires dans les conditions suivantes : risques électriques dans un environnement humide ou si l'on porte des vêtements mouillés ; sur des structures métalliques telles que sols, grilles ou échafaudages ; en position coincée comme assise, à genoux ou couchée ; ou s'il y a un risque élevé de contact inévitable ou accidentel avec la pièce à souder ou le sol. Dans ces conditions, voir ANSI Z49.1 énuméré dans les normes de sécurité. En outre, ne pas travailler seul !
- Couper l'alimentation d'entrée avant d'installer l'appareil ou d'effectuer l'entretien. Verrouiller ou étiqueter la sortie d'alimentation selon la norme OSHA 29 CFR 1910.147 (se reporter aux Principales normes de sécurité).
- N'utiliser que des tuyaux de refroidissement non conducteurs ayant une longueur minimale de 457 mm pour garantir l'isolation.
- Installer le poste correctement et le mettre à la terre convenablement selon les consignes du manuel de l'opérateur et les normes nationales, provinciales et locales.

☞ Indique des instructions spécifiques.



Ce groupe de symboles veut dire Avertissement! Attention! DANGER DE CHOC ELECTRIQUE, PIECES EN MOUVEMENT, et PIECES CHAUDES. Consulter les symboles et les instructions ci-dessous y afférant pour les actions nécessaires afin d'éviter le danger.

- Toujours vérifier la terre du cordon d'alimentation. Vérifier et s'assurer que le fil de terre du cordon d'alimentation est bien raccordé à la borne de terre du sectionneur ou que la fiche du cordon est raccordée à une prise correctement mise à la terre.
- En effectuant les raccordements d'entrée, fixer d'abord le conducteur de mise à la terre approprié et revérifier les connexions.
- Les câbles doivent être exempts d'humidité, d'huile et de graisse; protégez-les contre les étincelles et les pièces métalliques chaudes.
- Vérifier fréquemment le cordon d'alimentation afin de s'assurer qu'il n'est pas altéré ou à nu, le remplacer immédiatement s'il l'est. Un fil à nu peut entraîner la mort.
- L'équipement doit être hors tension lorsqu'il n'est pas utilisé.
- Ne pas utiliser des câbles usés, endommagés, de grosseur insuffisante ou mal épissés.
- Ne pas enrouler les câbles autour du corps.
- Ne pas toucher le circuit électrique si l'on est en contact avec la pièce, la terre ou le circuit électrique d'une autre machine.
- N'utiliser qu'un matériel en bon état. Réparer ou remplacer sur-le-champ les pièces endommagées. Entretenir l'appareil conformément à ce manuel.
- Porter un harnais de sécurité si l'on doit travailler au-dessus du sol.
- S'assurer que tous les panneaux et couvercles sont correctement en place.

Il reste une TENSION DC NON NÉGLIGEABLE dans les sources de soudage onduleur UNE FOIS le moteur coupé.

- Avant de toucher des organes internes, couper l'onduleur, débrancher l'alimentation et décharger les condensateurs d'alimentation conformément aux instructions indiquées dans la partie maintenance.



LES FUMÉES ET LES GAZ peuvent être dangereux.

Le chauffage à induction de certains matériaux, adhésifs et flux génère des fumées et des gaz. Leur inhalation peut être dangereuse pour votre santé.

- Ne pas mettre sa tête au-dessus des vapeurs. Ne pas respirer ces vapeurs.
- À l'intérieur, ventiler la zone et/ou utiliser une ventilation forcée au niveau de l'arc pour l'évacuation des fumées et des gaz.
- Si la ventilation est médiocre, porter un respirateur anti-vapeurs approuvé.
- Lire et comprendre les spécifications de sécurité des matériaux (MSDS) et les instructions du fabricant concernant les adhésifs, les

- flux, les métaux, les consommables, les revêtements, les nettoyants et les dégraissateurs.
- Travailler dans un espace fermé seulement s'il est bien ventilé ou en portant un respirateur. Demander toujours à un surveillant dûment formé de se tenir à proximité. Des fumées et des gaz provenant du chauffage peuvent déplacer l'air, abaisser le niveau d'oxygène et provoquer des lésions ou des accidents mortels. S'assurer que l'air ambiant ne présente aucun danger.
- Ne pas chauffer dans des endroits se trouvant à proximité d'opérations de dégraissage, de nettoyage ou de pulvérisation. La chaleur peut réagir en présence de vapeurs et former des gaz hautement toxiques et irritants.

- Ne pas surchauffer des métaux munis d'un revêtement tels que l'acier galvanisé, plaqué au plomb ou au cadmium, à moins que le revêtement ne soit enlevé de la zone chauffée, que la zone soit bien ventilée et, si nécessaire, en portant un respirateur. Les revêtements et tous les métaux contenant ces éléments peuvent dégager des fumées toxiques s'ils sont surchauffés. Voir les informations concernant la température dans les spécifications de revêtement MSDS.



Risque D'INCENDIE OU D'EXPLOSION.

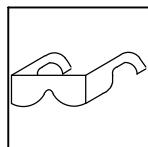
- Ne pas surchauffer les composants.
- Attention aux risques d'incendie: tenir un extincteur à proximité.
- Stocker des produits inflammables hors de la zone de travail.

2-3. Dangers supplémentaires en relation avec l'installation, le fonctionnement et la maintenance



LA CHUTE DE L'ÉQUIPEMENT peut provoquer des blessures.

- Utiliser la poignée et demander à une personne ayant la force physique nécessaire pour soulever l'appareil.
- Déplacer l'appareil à l'aide d'un chariot ou d'un engin similaire.
- Pour les unités sans poignée, utiliser un équipement de levage de capacité suffisante pour lever l'appareil.
- Tenir l'équipement (câbles et cordons) à distance des véhicules mobiles lors de toute opération en hauteur.
- En utilisant des fourches de levage pour déplacer l'unité, s'assurer que les fourches sont suffisamment longues pour dépasser du côté opposé de l'appareil.
- Suivre les consignes du Manuel des applications pour l'équation de levage NIOSH révisée (Publication N°94-110) lors du levage manuelle de pièces ou équipements lourds.



DES PIECES DE METAL ou DES SALETES peuvent provoquer des blessures dans les yeux.

- Porter des lunettes de sécurité à coques latérales ou un écran facial.



DES ORGANES MOBILES peuvent provoquer des blessures.

- S'abstenir de toucher des organes mobiles tels que des ventilateurs.
- Maintenir fermés et verrouillés les portes, panneaux, recouvrements et dispositifs de protection.

- Ne pas placer l'appareil sur, au-dessus ou à proximité de surfaces inflammables.
- Ne pas installer l'appareil à proximité de produits inflammables.
- Ne pas faire fonctionner l'appareil si l'air ambiant est chargé de particules, gaz, ou vapeurs inflammables (vapeur d'essence, par exemple).
- Une fois le travail achevé, assurez-vous qu'il ne reste aucune trace d'étincelles incandescentes ni de flammes.
- Utiliser exclusivement des fusibles ou coupe-circuits appropriés. Ne pas augmenter leur puissance; ne pas les poncer.



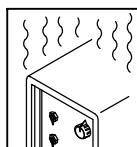
LE CHAUFFAGE PAR INDUCTION peut provoquer des brûlures.

- Ne pas toucher des parties chaudes à mains nues.
- Laisser refroidir les composants ou équipements avant de les manipuler.
- Ne pas toucher ou manipuler la tête/l'enroulement à induction pendant le fonctionnement.
- Tenir les bijoux et autres objets personnels en métal éloignés de la tête/de l'enroulement pendant le fonctionnement.
- Ne pas toucher aux pièces chaudes, utiliser les outils recommandés et porter des gants de soudage et des vêtements épais pour éviter les brûlures.



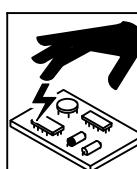
Les CHAMPS ÉLECTROMAGNÉTIQUES (CEM) peuvent affecter les implants médicaux.

- Les porteurs de stimulateurs cardiaques et autres implants médicaux doivent rester à distance.
- Les porteurs d'implants médicaux doivent consulter leur médecin et le fabricant du dispositif avant de s'approcher de la zone où se déroule du soudage à l'arc, du soudage par points, du gougeage, de la découpe plasma ou une opération de chauffage par induction.



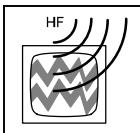
L'EMPLOI EXCESSIF peut SURCHAUFFER L'ÉQUIPEMENT.

- Prévoir une période de refroidissement
- Réduire le courant de sortie ou le facteur de marche avant de recommencer le chauffage.
- Respecter le cycle opératoire nominal.



LES CHARGES ÉLECTROSTATIQUES peuvent endommager les circuits imprimés.

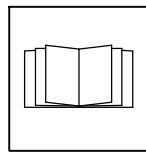
- Établir la connexion avec la barrette de terre AVANT de manipuler des cartes ou des pièces.
- Utiliser des pochettes et des boîtes antistatiques pour stocker, déplacer ou expédier des cartes PC.



LE RAYONNEMENT HAUTE FRÉQUENCE (HF) risque de provoquer des interférences.

- Le rayonnement haute fréquence (HF) peut provoquer des interférences avec les équipements de radio-navigation et de communication, les services de sécurité et les ordinateurs.
- Demander seulement à des personnes qualifiées familiarisées avec des équipements électroniques de faire fonctionner l'installation.
- L'utilisateur est tenu de faire corriger rapidement par un électricien qualifié les interférences résultant de l'installation.
- Si le FCC signale des interférences, arrêter immédiatement l'appareil.

- Effectuer régulièrement le contrôle et l'entretien de l'installation.
- Maintenir soigneusement fermés les portes et les panneaux des sources de haute fréquence.



LIRE LES INSTRUCTIONS.

- Lire et appliquer les instructions sur les étiquettes et le Mode d'emploi avant l'installation, l'utilisation ou l'entretien de l'appareil. Lire les informations de sécurité au début du manuel et dans chaque section.
- N'utiliser que les pièces de rechange recommandées par le constructeur.
- Effectuer l'entretien en respectant les manuels d'utilisation, les normes industrielles et les codes nationaux, d'état et locaux.

2-4. Proposition californienne 65 Avertissements

⚠ Les équipements de soudage et de coupe produisent des fumées et des gaz qui contiennent des produits chimiques dont l'État de Californie reconnaît qu'ils provoquent des malformations congénitales et, dans certains cas, des cancers. (Code de santé et de sécurité de Californie, chapitre 25249.5 et suivants).

⚠ Les batteries, les bornes et autres accessoires contiennent du plomb et des composés à base de plomb, produits chimiques dont l'État de Californie reconnaît qu'ils provoquent des cancers et des malformations congénitales ou autres problèmes de procréation. Se laver les mains après manipulation.

⚠ Ce produit contient des éléments chimiques, dont le plomb, reconnus par l'État de Californie pour leur caractère cancérogène ainsi que provoquant des malformations congénitales ou autres problèmes de procréation. Se laver les mains après toute manipulation.

Pour les moteurs à essence :

⚠ Les gaz d'échappement des moteurs contiennent des produits chimiques dont l'État de Californie reconnaît qu'ils provoquent des cancers et des malformations congénitales ou autres problèmes de procréation.

Pour les moteurs diesel :

⚠ Les gaz d'échappement des moteurs diesel et certains de leurs composants sont reconnus par l'État de Californie comme provoquant des cancers et des malformations congénitales ou autres problèmes de procréation.

2-5. Principales normes de sécurité

Safety in Welding, Cutting, and Allied Processes, ANSI Standard Z49.1, from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

Safety in Welding, Cutting, and Allied Processes, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 5060 Spectrum Way, Suite 100, Ontario, Canada L4W 5NS (phone: 800-463-6727, website: www.csa-international.org).

OSHA, Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910, Subpart Q, and Part 1926, Subpart J, from U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 (phone: 1-866-512-1800) (there are 10 OSHA Regional Offices—phone for Region 5, Chicago, is 312-353-2220, website: www.osha.gov).

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, Quincy, MA 02269 (phone: 1-800-344-3555, website: www.nfpa.org and www.sparky.org).

Canadian Electrical Code Part 1, CSA Standard C22.1, from Canadian Standards Association, Standards Sales, 5060 Spectrum Way, Suite 100, Mississauga, Ontario, Canada L4W 5NS (phone: 800-463-6727, website: www.csa-international.org).

Safe Practice For Occupational And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 25 West 43rd Street, New York, NY 10036 (phone: 212-642-4900, website: www.ansi.org).

Applications Manual for the Revised NIOSH Lifting Equation, The National Institute for Occupational Safety and Health (NIOSH), 1600 Clifton Rd, Atlanta, GA 30333 (phone: 1-800-232-4636, website: www.cdc.gov/NIOSH).

2-6. Informations relatives aux CEM

Le courant électrique qui traverse tout conducteur génère des champs électromagnétiques (CEM) à certains endroits. Le courant de soudage crée un CEM autour du circuit et du matériel de soudage. Les CEM peuvent créer des interférences avec certains implants médicaux comme des stimulateurs cardiaques. Des mesures de protection pour les porteurs d'implants médicaux doivent être prises: par exemple, des restrictions d'accès pour les passants ou une évaluation individuelle des risques pour les soudeurs. Tous les soudeurs doivent appliquer les procédures suivantes pour minimiser l'exposition aux CEM provenant du circuit de soudage:

1. Rassembler les câbles en les torsadant ou en les attachant avec du ruban adhésif ou avec une housse.
2. Ne pas se tenir au milieu des câbles de soudage. Disposer les câbles d'un côté et à distance de l'opérateur.
3. Ne pas courber et ne pas entourer les câbles autour de votre corps.

4. Maintenir la tête et le torse aussi loin que possible du matériel du circuit de soudage.
5. Connecter la pince sur la pièce aussi près que possible de la soudure.
6. Ne pas travailler à proximité d'une source de soudage, ni s'asseoir ou se pencher dessus.
7. Ne pas souder tout en portant la source de soudage ou le dévidoir.

En ce qui concerne les implants médicaux :

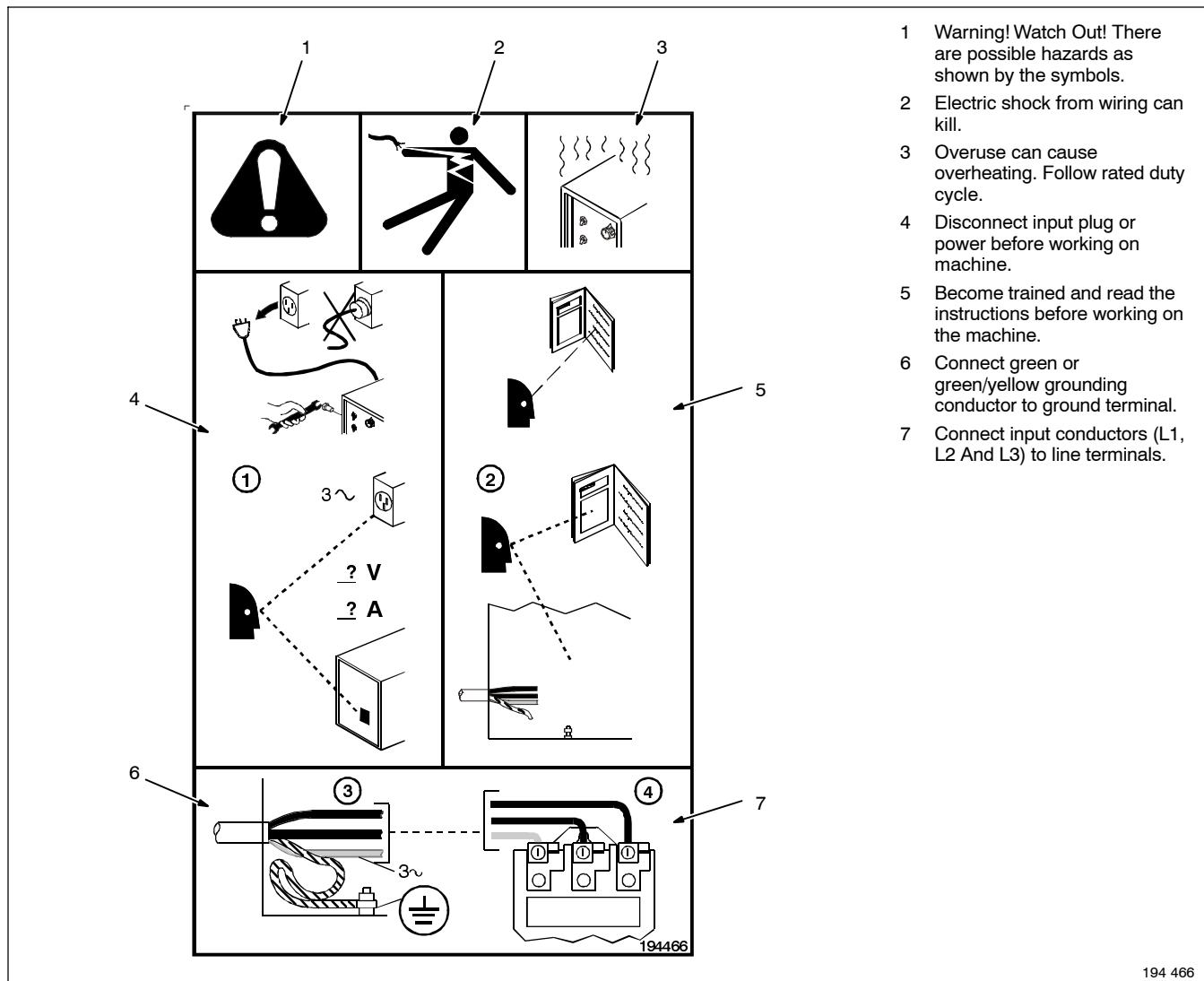
Les porteurs d'implants doivent d'abord consulter leur médecin avant de s'approcher des opérations de soudage à l'arc, de soudage par points, de gougeage, du coupage plasma ou de chauffage par induction. Si le médecin approuve, il est recommandé de suivre les procédures précédentes.

SECTION 3 – DEFINITIONS

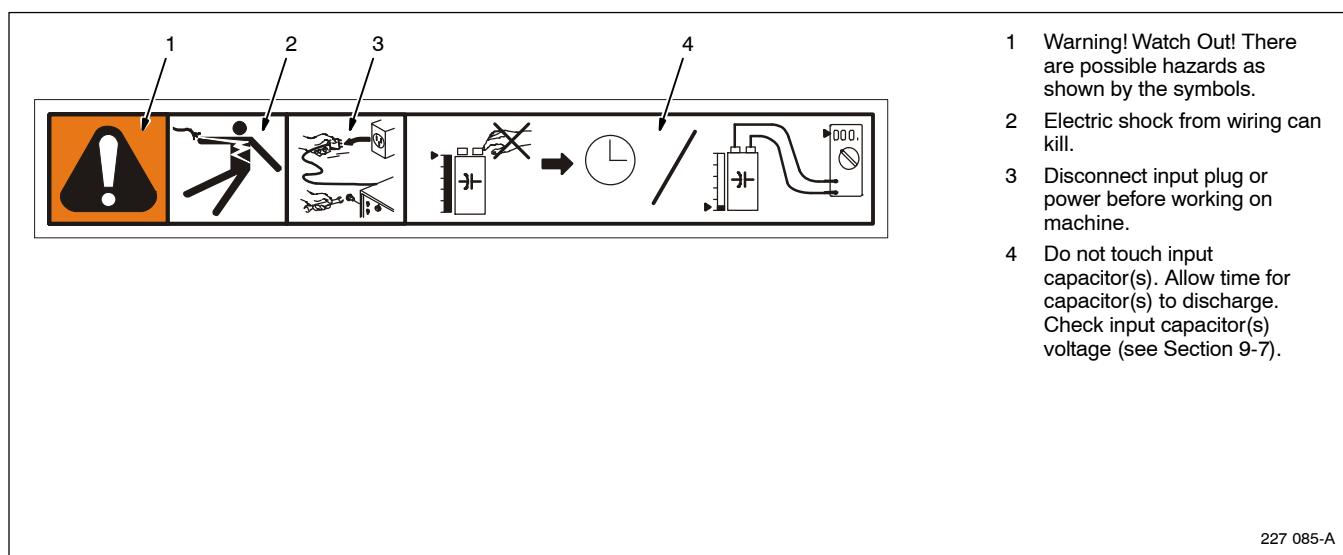
3-1. Warning Label Definitions



3-1. Warning Label Definitions (Continued)



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3-2. Symbols And Definitions

Some symbols are found only on CE products.

A	Amperes	V	Volts		Alternating Current	X	Duty Cycle
IP	Degree Of Protection	Hz	Hertz		Circuit Protector		Output
	Increase		Line Connection		Primary Current		Rated Current
U₁	Primary Voltage	U₂	Load Voltage		Read Instructions		Three Phase Static Frequency Con- verter-Trans- former-Fre- quency Con- verter
I_{1max}	Rated Maximum Supply Current	P_{1max}	Maximum Power Consumption		Three Phase	%	Percent
	Remote		Panel/Local		High Temperature		Voltage Input
	Off		On				

SECTION 4 – INSTALLATION

4-1. Serial Number and Rating Label Location

The serial number and rating information for the power source is located on the front of the machine. Use the rating labels to determine input power requirements and/or rated output. For future reference, write serial number in space provided on back cover of this manual.

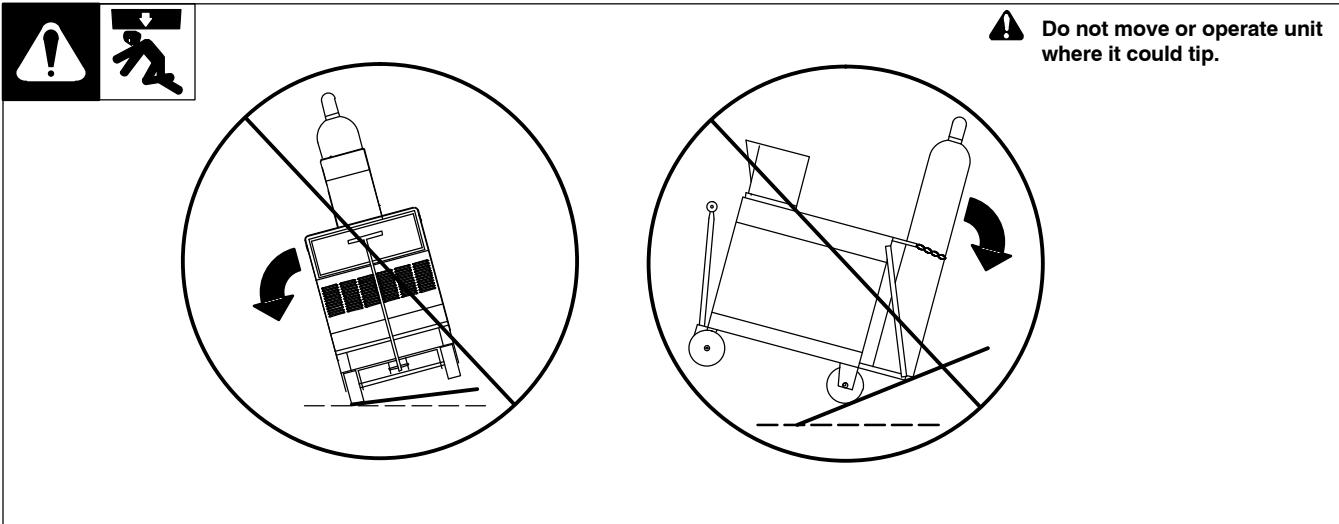
4-2. Specifications

Output Frequency	Rated Output		Required Reflective Inductance	Amperes Input at Rated Load Output 50 or 60 Hz, Three-Phase			kVA	kW	Overall Dimensions	Weight
	Single Output	Dual Output		400 V	460 V	575 V				
5 To 30 kHz	35 kW At 100% Duty Cycle 350 A (RMS), 700 V (RMS)	35 kW At 100% Duty Cycle 700 A (RMS), 700 V (RMS)	2.5 To 50 μ H	60 A	50 A	40 A	39	37	Length: 36-3/4 in. (993 mm) Width: 21-1/2 in. (546 mm) Height: 29 in. (737 mm)	227 lb (103 kg)
Storage Temperature Range: -40° F (-40° C) to 122° F (50° C)										
*While idling										

4-3. Selecting A Location

					<ol style="list-style-type: none"> 1. Lifting Eye 2. Lifting Forks <p>Use lifting eye or lifting forks to move unit.</p> <p>If using lifting forks, extend forks beyond opposite side of unit.</p> <ol style="list-style-type: none"> 3. Line Disconnect Device <p>Locate unit near correct input power supply.</p> <p>⚠ Special installation may be required where gasoline or volatile liquids are present – see NEC Article 511 or CEC Section 20.</p>
Movement					
Location And Airflow					

4-4. Tipping



4-5. Electrical Service Guide

⚠ Failure to follow these electrical service guide recommendations could create an electric shock or fire hazard. These recommendations are for a dedicated circuit sized for the rated output and duty cycle of the welding power source.

In dedicated circuit installations, the National Electrical Code (NEC) allows the receptacle or conductor rating to be less than the rating of the circuit protection device. All components of the circuit must be physically compatible. See NEC articles 210.21, 630.11, and 630.12.

	50 Hz Three Phase	60 Hz Three Phase	
Input Voltage (V)	400	460	575
Input Amperes (A) At Rated Output	60	50	40
Max Recommended Standard Fuse Or Circuit Breaker Rating In Amperes ¹			
Circuit Breaker ¹, Time-Delay Fuses ²	70	61	45
Normal Operating Fuses ³	80	70	60
Min Input Conductor Size In AWG ⁴	6	8	8
Max Recommended Input Conductor Length In Feet (Meters)	254 (77)	214 (65)	334 (102)
Min Grounding Conductor Size In AWG ⁴	8	8	10

Reference: 2011 National Electrical Code (NEC) (including article 630)

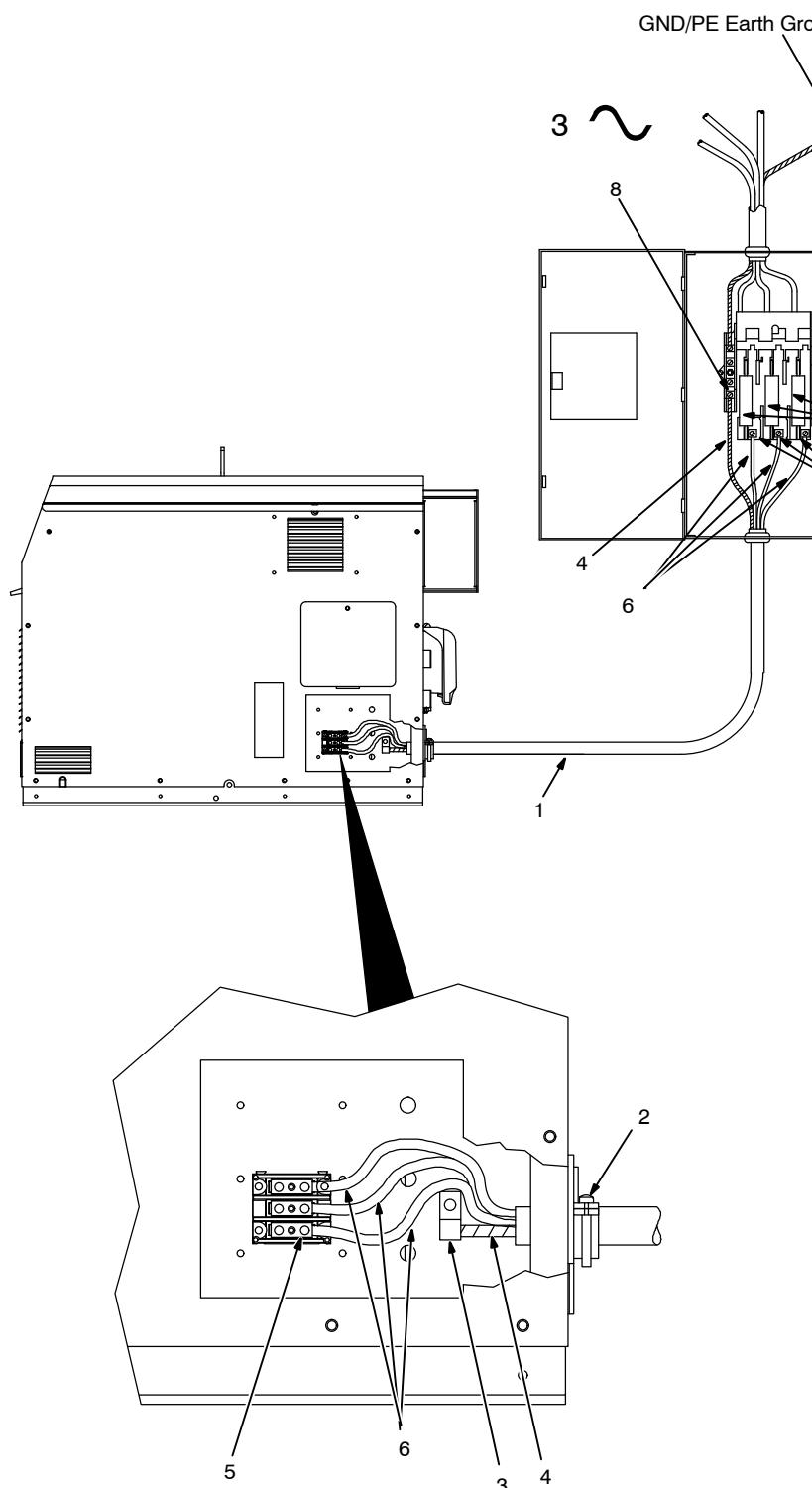
1 If a circuit breaker is used in place of a fuse, choose a circuit breaker with time-current curves comparable to the recommended fuse.

2 "Time-Delay" fuses are UL class "RK5". See UL 248.

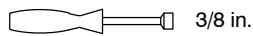
3 "Normal Operating" (general purpose - no intentional delay) fuses are UL class "K5" (up to and including 60 amps), and UL class "H" (65 amps and above).

4 Conductor data in this section specifies conductor size (excluding flexible cord or cable) between the panelboard and the equipment per NEC Table 310.15(B)(16). If a flexible cord or cable is used, minimum conductor size may increase. See NEC Table 400.5(A) for flexible cord and cable requirements.

4-6. Connecting 3-Phase Input Power For 460/575 Volt Models



Tools Needed:



⚠ Installation must meet all National and Local Codes – have only qualified persons make this installation.

⚠ Disconnect and lockout/tagout input power before connecting input conductors from unit.

⚠ Make input power connections to the welding power source first.

⚠ Always connect green or green/yellow conductor to supply grounding terminal first, and never to a line terminal.

The circuitry in this unit automatically adapts the power source to the primary voltage being applied. Check input voltage available at site. This unit can be connected to either 460 or 575 VAC input power.

10 See rating label on unit and check input voltage available at site.

1. Input Power Conductors (Customer Supplied Cord)

Select size and length of conductors using Section 4-5. Conductors must comply with national, state, and local electrical codes. If applicable, use lugs of proper amperage capacity and correct hole size.

Welding Power Source Input Power Connections

2. Strain Relief

Route conductors (cord) through strain relief and tighten screws.

3. Machine Grounding Terminal

4. Green Or Green/Yellow Grounding Conductor

Connect green or green/yellow grounding conductor to welding power source grounding terminal first.

5. Welding Power Source Line Terminals

6. Input Conductors L1 (U), L2 (V) And L3 (W)

Connect input conductors L1 (U), L2 (V) and L3 (W) to welding power source line terminals.

Close and secure access door on welding power source.

Disconnect Device Input Power Connections

7. Disconnect Device (switch shown in OFF position)

8. Disconnect Device (Supply Grounding Terminal)

Connect green or green/yellow grounding conductor to disconnect device grounding terminal first.

9. Disconnect Device Line Terminals

Connect input conductors L1 (U), L2 (V) And L3 (W) to disconnect device line terminals.

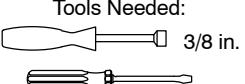
10. Over-Current Protection

Select type and size of over-current protection using Section 4-5 (fused disconnect switch shown).

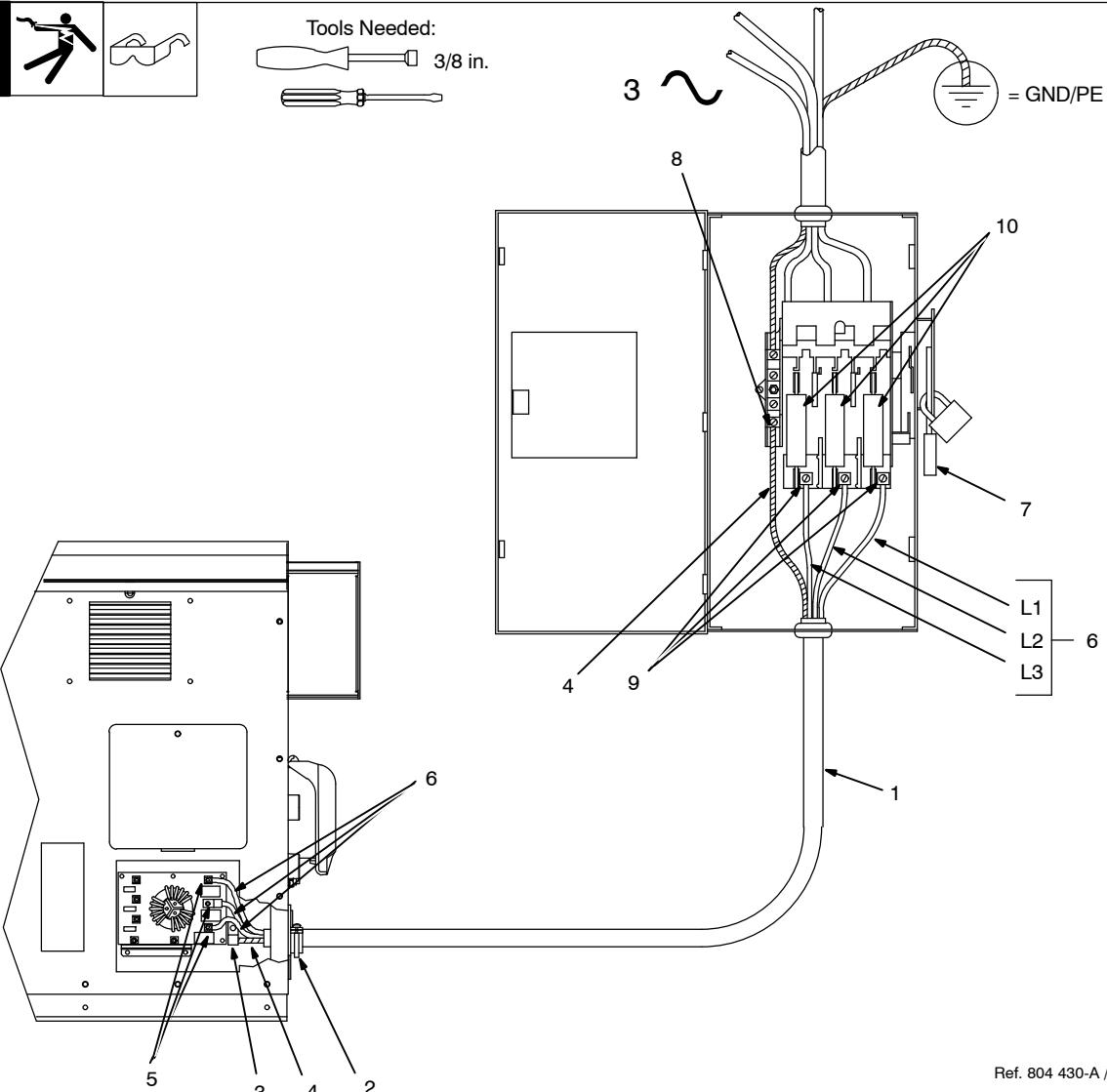
Close and secure door on line disconnect device. Remove lockout/tagout device, and place switch in the On position.

4-7. Connecting 3-Phase Input Power For 400/460 Volt Models

Tools Needed:



Welding Power Source Input Power Connections



Ref. 804 430-A / Ref. 804 598-A

Installation must meet all National and Local Codes – have only qualified persons make this installation.

Disconnect and lockout/tagout input power before connecting input conductors from unit.

Make input power connections to the welding power source first.

Always connect green or green/yellow conductor to supply grounding terminal first, and never to a line terminal.

The circuitry in this unit automatically adapts the power source to the primary voltage being applied. Check input voltage available at site. This unit can be connected to either 400 or 460 VAC input power.

See rating label on unit and check input voltage available at site.

- Input Power Conductors (Customer Supplied Cord)

Select size and length of conductors using Section 4-5. Conductors must comply with national, state, and local electrical codes. If applicable, use lugs of proper amperage capacity and correct hole size.

Welding Power Source Input Power Connections

- Strain Relief
- Route conductors (cord) through strain relief and tighten screws.
- Machine Grounding Terminal
- Green Or Green/Yellow Grounding Conductor
- Welding Power Source Line Terminals
- Input Conductors L1 (U), L2 (V) And L3 (W)

Connect green or green/yellow grounding conductor to welding power source grounding terminal first.

Connect input conductors L1 (U), L2 (V) and L3 (W) to welding power source line terminals.

Close and secure access door on welding power source.

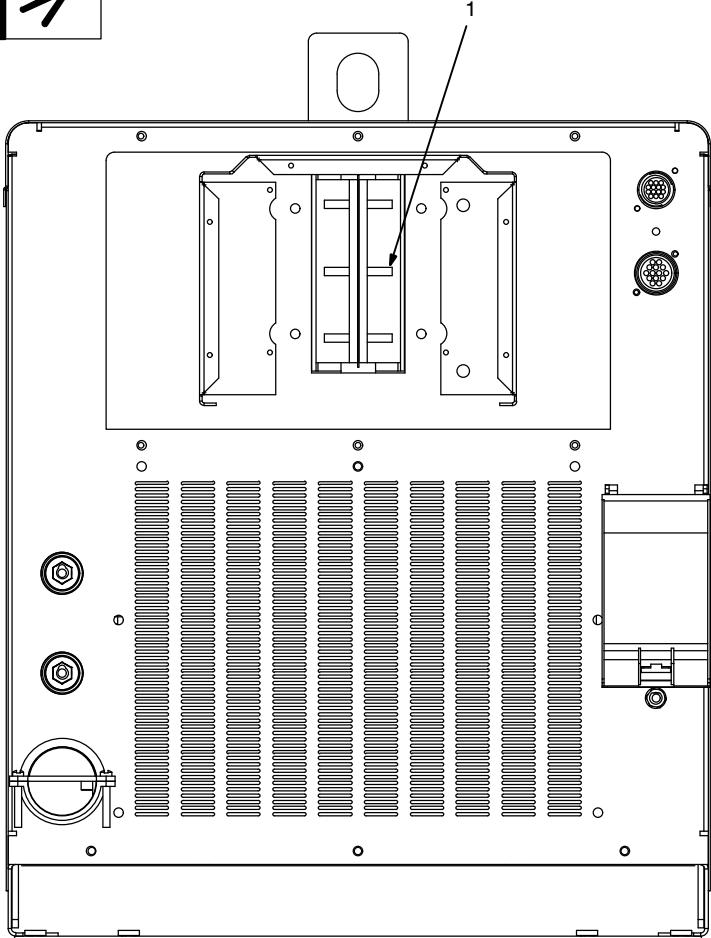
Disconnect Device Input Power Connections

- Disconnect Device (switch shown in OFF position)
- Disconnect Device (Supply) Grounding Terminal
- Disconnect Device Line Terminals
- Over-Current Protection

Select type and size of over-current protection using Section 4-5 (fused disconnect switch shown).

Close and secure door on line disconnect device. Remove lockout/tagout device, and place switch in the On position.

4-8. Power Source Output Connections

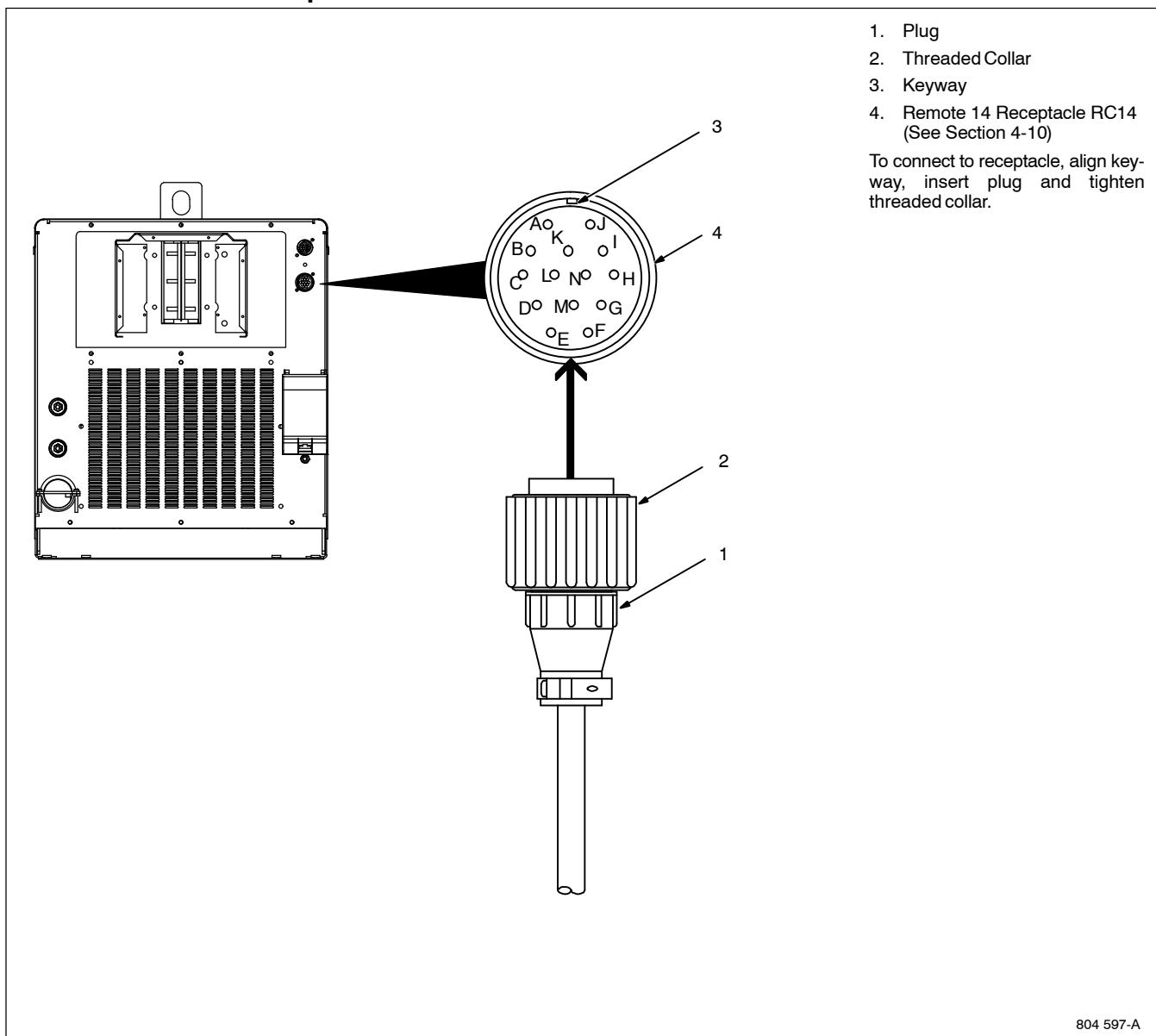


1. Output Bus Bars

Use supplied 1/4-20 nuts to make electrical connections to the output bus bars as required by the specific application.

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4-9. Remote 14 Receptacle RC14 Information and Connections

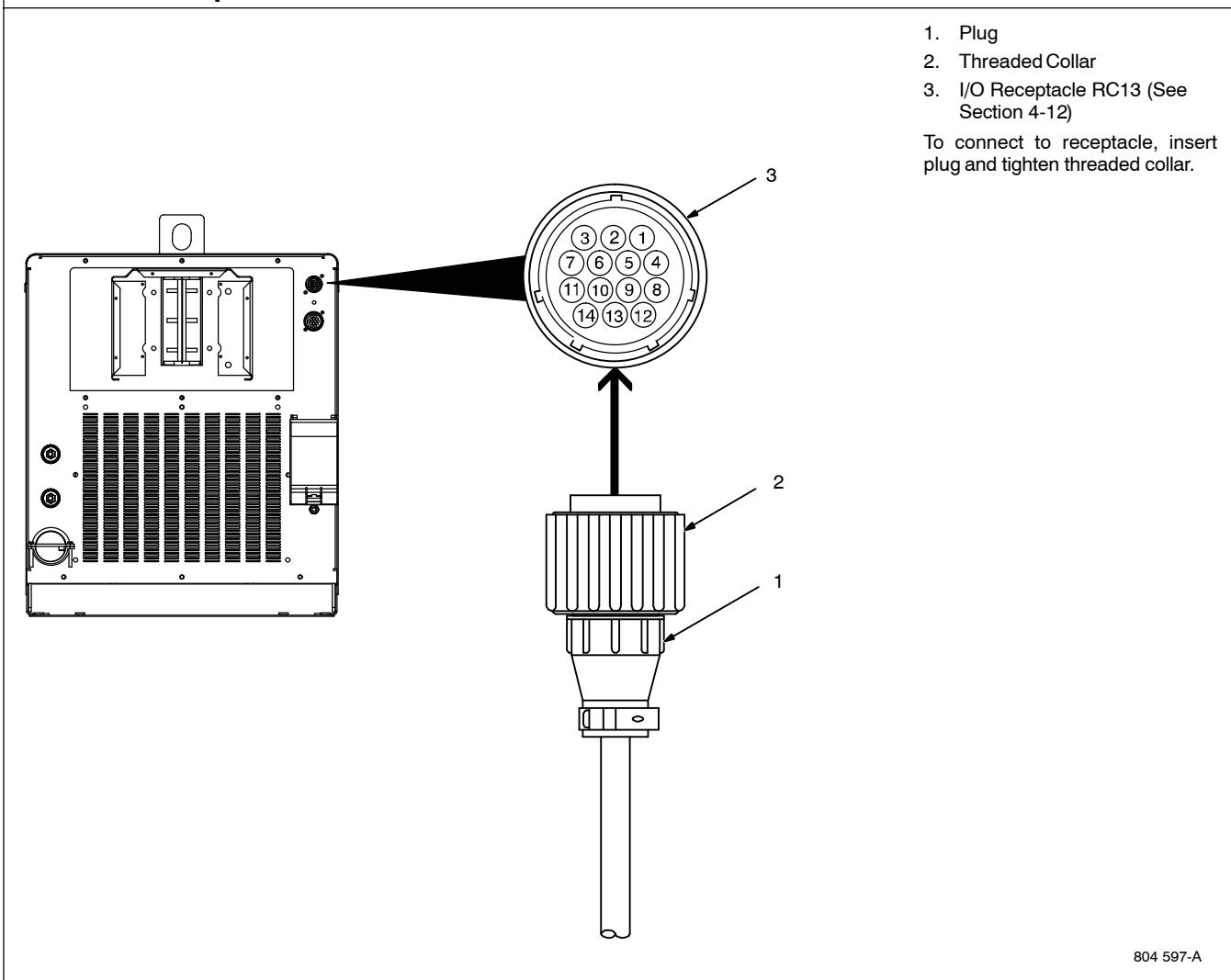


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4-10. Remote 14 Socket Information

Socket	 REMOTE 14	Socket Information
A B	Remote Contactor	+24 volts DC. Contact closure to A completes 24 volts DC contactor control circuit.
C D E G	Remote Output Control	Command reference; +10 volts DC. Control circuit common. Input command signal (potentiometer wiper or 0 to +10 volts DC). Not used.
F, J	Power Source Limit	Absence of internal contact closure between F and J signals power source error to remote control device.
H I L M N K	Remote Metering	Not used. Actual frequency output signal (1 volt/10 kHz). Average power output signal (1 volt/10 kW). Voltage output signal RMS (1 volt/100 volts). Total current output signal RMS (1 volt/100 amperes). Chassis common.

4-11. I/O Receptacle RC13 Information And Connections

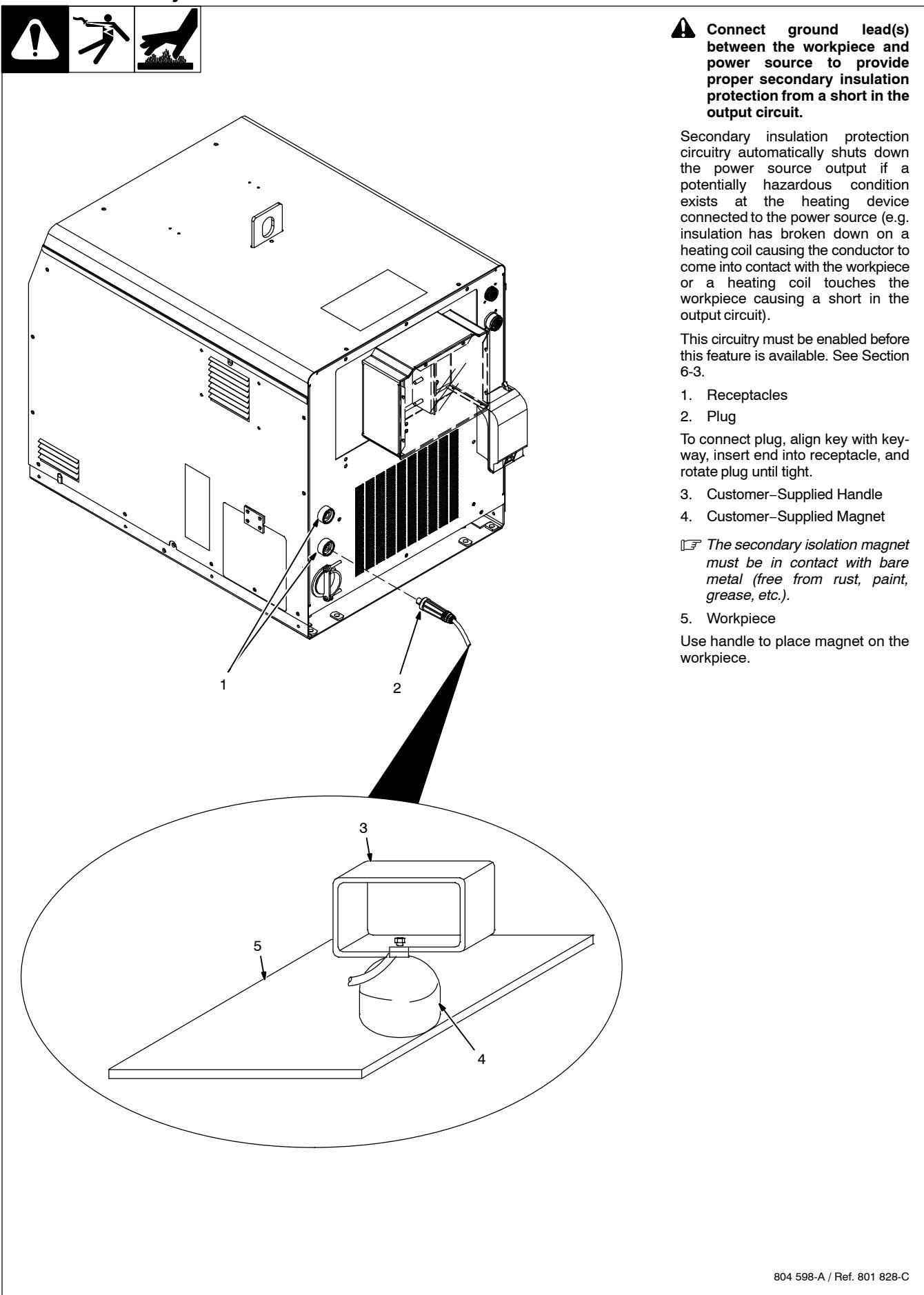


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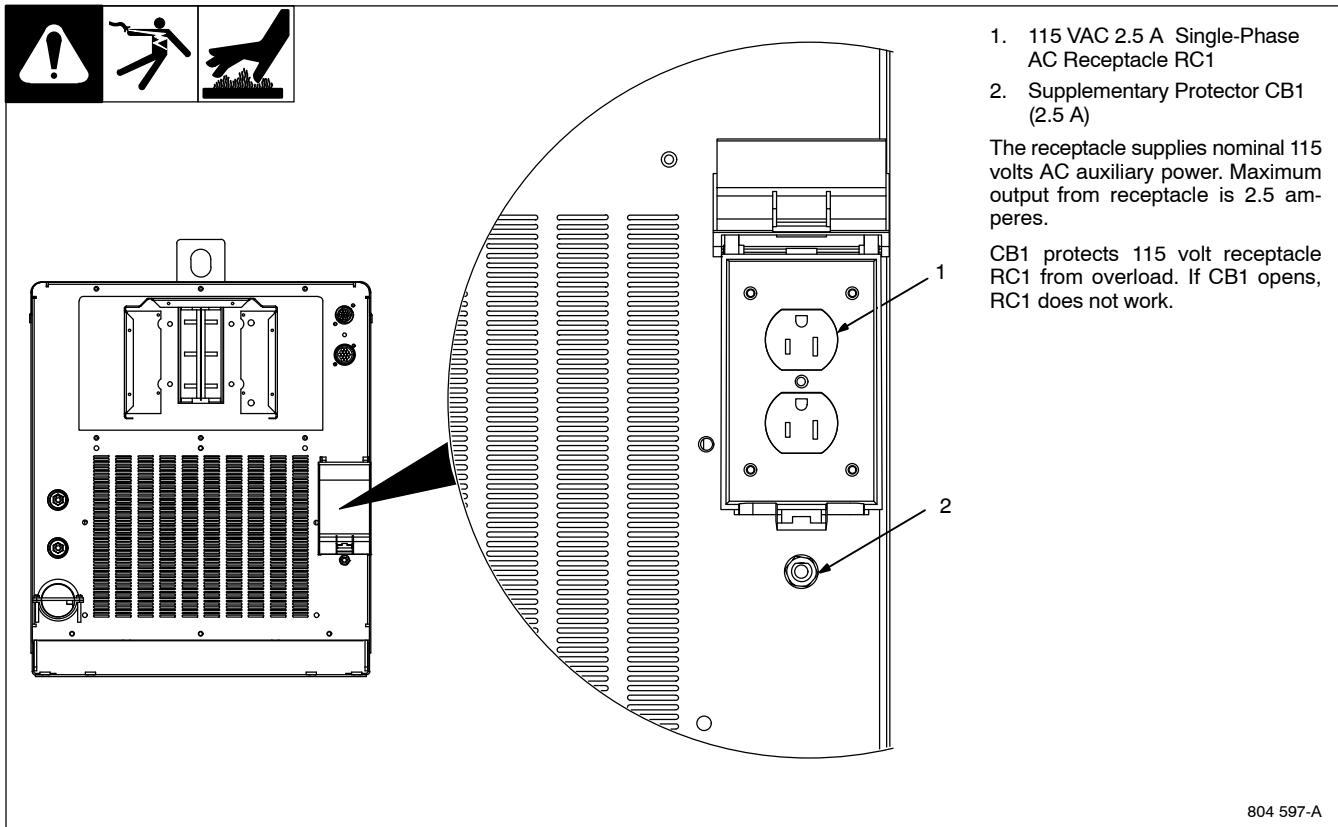
4-12. I/O Receptacle RC13 Socket Information

	Socket No.	Socket Information
	1	Incycle Common
	2	Incycle Normally Closed
	3	Incycle Normally Open
	4	Auxiliary Common
	5	Auxiliary Normally Closed
	6	Auxiliary Normally Open
	7	Limit Common
	8	Limit Normally Closed
	9	Limit Normally Open
	10	Not Used
	11	External Interrupt – This works like an interlock (if enabled via the setup screens). This could be used as a coolant flow switch or for other purposes.
	12	+24 volts DC
	13	+24 volts DC
	14	Remote Enable – This is the external contact closure to enable output when in Remote mode.

4-13. Secondary Insulation Protection

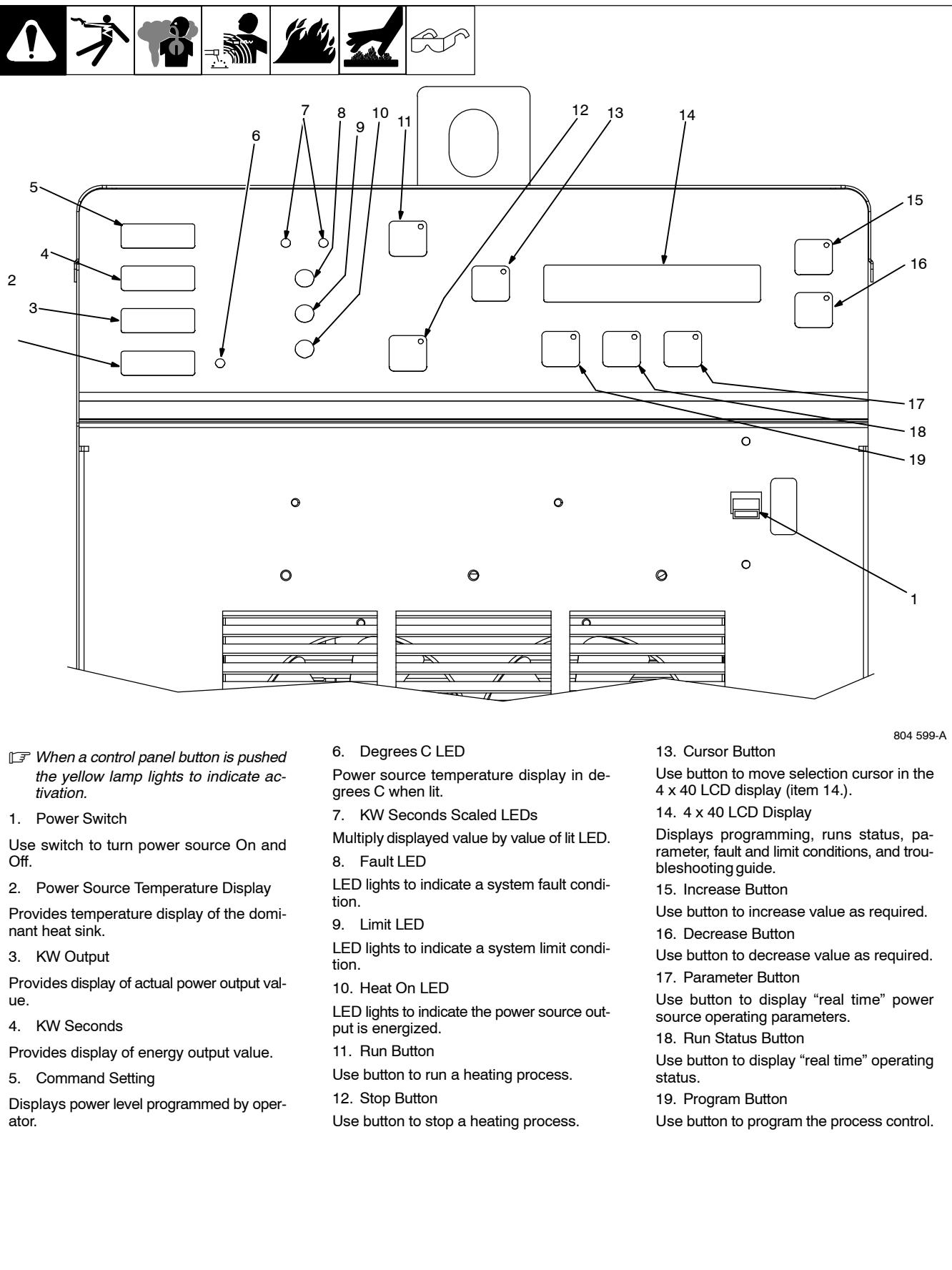


4-14. 115 Volt AC Duplex Receptacle And Supplementary Protector



SECTION 5 – COMPONENTS AND CONTROLS

5-1. Controls



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When a control panel button is pushed the yellow lamp lights to indicate activation.

1. Power Switch

Use switch to turn power source On and Off.

2. Power Source Temperature Display

Provides temperature display of the dominant heat sink.

3. KW Output

Provides display of actual power output value.

4. KW Seconds

Provides display of energy output value.

5. Command Setting

Displays power level programmed by operator.

6. Degrees C LED

Power source temperature display in degrees C when lit.

7. KW Seconds Scaled LEDs

Multiply displayed value by value of lit LED.

8. Fault LED

LED lights to indicate a system fault condition.

9. Limit LED

LED lights to indicate a system limit condition.

10. Heat On LED

LED lights to indicate the power source output is energized.

11. Run Button

Use button to run a heating process.

12. Stop Button

Use button to stop a heating process.

13. Cursor Button

Use button to move selection cursor in the 4 x 40 LCD display (item 14.).

14. 4 x 40 LCD Display

Displays programming, runs status, parameter, fault and limit conditions, and troubleshooting guide.

15. Increase Button

Use button to increase value as required.

16. Decrease Button

Use button to decrease value as required.

17. Parameter Button

Use button to display “real time” power source operating parameters.

18. Run Status Button

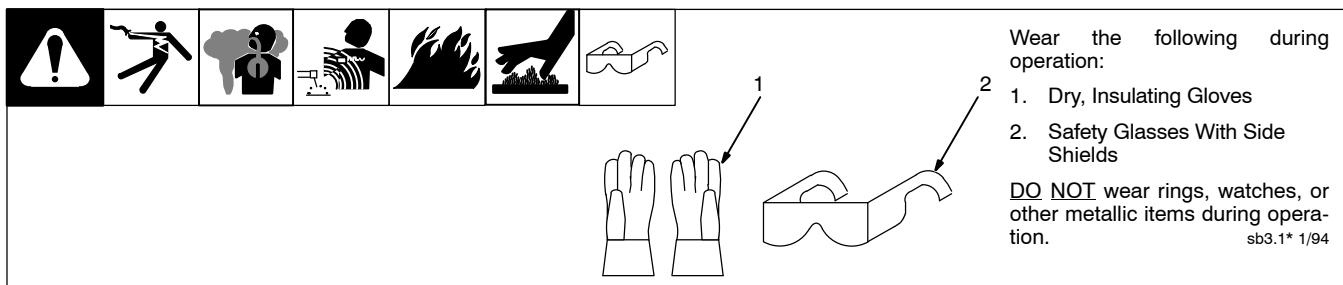
Use button to display “real time” operating status.

19. Program Button

Use button to program the process control.

SECTION 6 – SETUP AND OPERATION

6-1. Safety Equipment



6-2. System Description

The Tocotron AC is intelligent to the point that it will automatically adjust output power levels if internal system operating parameters or internal temperatures reach or exceed specific set limits (see Section 9).

6-3. Power Source/System Setup

To view the System Setup screen, simultaneously press the Parameters and Program buttons and the following screen appears on the display:

```
Time Resolution: Seconds           SETUP1
KW Second Alarm: No   Min:      0 Max: 9999
KW Second Scale: x1    ExtInterrupt: YES
Remote Enable...: No
```

```
System Lock.: No                  SETUP2
Control Mode: Timed      Command: Power
Max KW.....: 35     Degree Units: °F
Backlight....: Yes    Isolation Detect: Yes
```

To change a setting:

- Press the Cursor button to move the cursor to the parameter to be changed
- Press Increase or Decrease button to select desired setup feature.

Possible selections Setup 1:

Time Resolution in seconds – 0.1 second increments

KW Second Alarm – Yes/No Minimum: 0–9999, Maximum: 0–9999

KW Second Scale – x1, x10, x100 External Interrupt – Yes/No

Remote Enable – Yes/No

Possible selections Setup 2:

System Lock – Yes/No

Control Mode – Timed / Remote / Manual

Max KW: 1–35

Backlight – Yes/No

Command – Power / Voltage / Current

Degree Units – °F / °C

Isolation Detect – Yes/No

Time Resolution – press the Increase  or Decrease  button to select the desired time resolution.

- The factory default is seconds.

KW Second Alarm – press the Increase  or Decrease  button to select the desired KW Second Alarm.

- The factory default is No.
- If KW Second Alarm is enabled, set Minimum and Maximum values.

KW Second Scale – press the Increase  or Decrease  button to select the desired KW Second Scale.

- The factory default is x1.

External Interrupt – press the Increase  or Decrease  button to enable or disable this feature.

- The factory default is Yes.

Remote Enable – press the Increase  or Decrease  button to select a remote command source.

- The factory default is No.

System Lock – press the Increase  or Decrease  button to lock or unlock the operator interface to

prevent tampering with any programs. Yes indicates the system is locked, and No indicates the system is unlocked.

- The factory default is No (unlocked).

Control Mode – press the Increase  or Decrease  button to select the desired method of system

control. For more de-

tails about methods of control, see Section 6-4.

- The factory default is time based control.

Command – press the Increase  or Decrease  button to select the desired command mode.

- The factory default is Power.

Max KW – press the Increase  or Decrease  button to adjust the maximum power source output.

- The factory default is 35 kW.

Degree Units – press the Increase  or Decrease  buttons to select temperature units. Selection will

drive the °C indicator

LED.

- The factory default is °C.

Backlight – press the Increase  or Decrease  button to turn LCD display backlight On or Off.

- The factory default is On.

Isolation Detect – press the Increase  or Decrease  button to enable or disable this feature.

- The factory default is Yes.

 All parameters in System Setup are considered global, and any changes to the system set-up parameters will apply to all programs.

To reset the system back to factory default settings, turn off the power source, and wait until the display goes blank. Turn on the power source. When the display lights, press and hold the Increase  and Decrease  buttons. A message will display Press Program to reset factory defaults. Release the Increase  and Decrease  buttons, and press the Program  button.

6-4. Programming

Programming allows the operator to setup a program for a particular heating process. The selections available are Timed, Remote, or Manual.

6-4-1. Time-Based Control

Time-based control operates the system and controls the heating process based on programmed time and power, voltage, current, or energy values. An auxiliary relay can also be programmed to interface with a PLC or similar controller.

Press the Program button to access the programming mode. Use the cursor button to move the cursor between Program, Segement, Type, Power, and Time.

```
Mode....: Timed
Program: 1 Segment: 1
Type...:>Power Level
Power...: 0.0 KW      Time: 00:00:00
```

The default position of the cursor is next to Program. Press the Increase  or Decrease  button.

Use the Cursor  button to move the cursor to the desired selection, and press the Increase  or Decrease  button to change the value to the desired setting.

Possible selections Timed:

Program: 1 – 8

Segement: 1 – 10

Type: Power Level, Slope, KW Seconds, End

Power: 0.0 – 35 or Voltage: 0.0 – 700, or Current: 0.0 – 700 Time: 00:00:00 – 99:59:59 or infinity

6-4-2. Remote Control

If Remote was selected as the control mode in the setup window, the following screen appears for programming:

Mode.....: Remote	Power...: 0.0 KW
Run Time:>00:03:00	Current: 0 A
	Voltage: 0 V
	Frequency: 4.5 KHz

Time is the only parameter that can be set. The values are 0 – 99:59:59 or infinity.

6-4-3. Manual Control

Manual control allows programming of a specific power level for a specific period of time. When this process is selected, the following screen appears on the display:

Mode.....: Manual	Power...: 0.0 KW
Command.: 0.0 KW	Current: 0 A
Run Time: 00:03:00	Voltage: 0 V
	Frequency: 4.5 KHz

The only programmable selections are Command power and Run Time. Command can be adjusted to deliver up to 35 KW (based on maximum power selected in the set-up screen) for a period of up to 99 hours, 59 minutes, 59 seconds or infinity.

6-4-4. Auxiliary Relay

The Auxiliary Relay is fully programmable for use in controlling auxiliary equipment such as lamps and solenoids and can operate after the heating cycle ends. The delay time and on time are set during programming.

Possible selections:

Enable – Yes/No

Delay Time – 00:00:00 – 99:59:59 Or Infinity

On Time – 00:00:00 – 99:59:59 Or Infinity

Auxiliary Relay
Enable.....: No
Delay Time.: 00:00:00
On Time....: 00:00:00

6-5. Run Status

Run status allows the operator to check status of a program during in-process heating. Depending on the control mode (Timed, Remote, or Manual), different style screens appear on the display. Run status is for monitoring purposes only and has no selectable or changeable parameters.

6-5-1. Time Based Control

Mode....: Timed	Segment KWS:
Program: 1 Segment: 1	0 x1
Type....: End	
Power...: 0.0 KW	SegmentTime: 00:00:00

Mode displays the control mode. Also displayed are the present program number, program segment, KW seconds, Segment type, current power level and elapsed time of the current segment.

6-5-2. Remote Control

Mode.....: Remote
Power....: 0.0 KW
CycleTime: 00:00:00
Status...: Stopped

During active operation, Power shows the actual power delivered from the power source, Cycle Time shows the elapsed time of the heating cycle, and Status indicates if the system is running or stopped. This screen is for monitoring purposes only.

 *No changes can be made to the run status screen, and the Cursor, Increase and Decrease buttons are not functional.*

6-5-3. Manual Control

Mode.....: Manual
Power....: 0.0 KW
CycleTime: 00:00:00
Status...: Stopped

During active operation, Power shows the actual power delivered from the power source, Cycle Time shows the elapsed time in the heating cycle, and Status indicates if the system is running or stopped. This screen is for monitoring purposes only.

 *No changes can be made to the run status screen, and the Cursor, Increase and Decrease buttons are not functional.*

6-6. Parameters

During active operation, the Parameters screen allows the operator to monitor the power source output operating parameters. These parameters include output power, output amperage, output voltage, and output frequency. The Parameters screen is for monitoring purposes only and has no selectable or changeable parameters. Once the cycle has ended or the Stop button has been pressed, the Power, Voltage, and Current values return to zero (0). To review the latest run parameter, press and hold the Parameters button.

Power....:	0.0 KW
Current...:	0 A
Voltage...:	0 V
Frequency:	4.5 KHz
CycleTime:	00:00:00

6-7. Real-Time Operation

Each time the unit is first turned On it initiates a system check routine that includes verification of communication between circuit boards and checking for output isolation faults. During this check routine, all displays and LEDs illuminate and the following screen appears on the display:

TOCCOTRON AC
Firmware Revision OEM 0.52
Copyright (c) 2006
MEM

X.XX indicates the firmware revision number installed in the unit.

If an error is detected during the check routine, the system fault LED illuminates and an error message screen appears on the display (see Section 9-5).

When the check routine is completed successfully, the operator interface defaults to the following:

- The Stop  button indicator LED illuminates to indicate no heating cycle is in process.
- The display defaults to the Run Status screen from the last program used and the Run Status  button indicator LED illuminates.
- If no fault or limit conditions are present, system status lights are not illuminated.

Once set up is complete for the desired program procedure (see Section 6-3), pressing the Run  button will initiate a heating cycle. When a

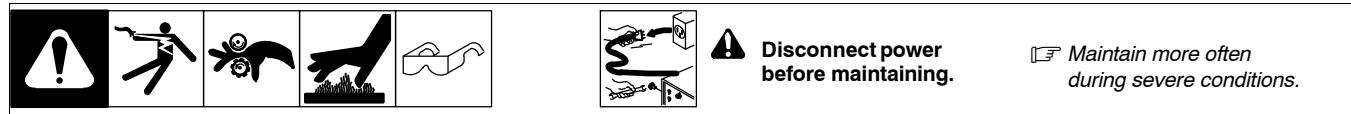
program run is initiated, the Run  button yellow indicator LED illuminates and the Heat On blue indicator LED illuminates to indicate output is present to the coil. The cycle will continue until the end of the program is reached or the Stop  button is pressed.

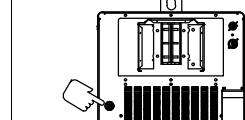
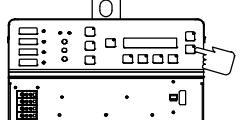
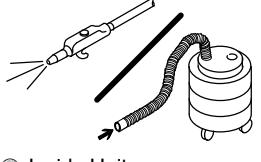
- Press the Program  button and the yellow indicator LED will illuminate. The display will change to show the current mode of operation or the current segment of a Timed Program.
- Use the Cursor  button to move the cursor to the parameter that will be changed.
- Press the Increase  or Decrease  button to make desired changes.

- Press the Run  button to resume program operation and the yellow indicator LED will illuminate.
- Press the Stop  button to end the program.

SECTION 7 – MAINTENANCE

7-1. Routine Maintenance



	\checkmark = Check \diamond = Change \bullet = Clean \star = Replace * To be done by Factory Authorized Service Agent				Reference
Every 3 Months	 \star Damaged or Unreadable Labels	 \bullet Output Bus Bar Contacts	 \bullet Ground Sense Lead Receptacles	 \bullet Operator Interface Overlay	Section 4-8
Every 6 Months	 $\checkmark \star$ Cracked Cables				Section 9-8
	 \bullet Inside Unit				

SECTION 8 – SAFETY PRECAUTIONS FOR SERVICING

⚠ Protect yourself and others from injury — read and follow these precautions.

8-1. Symbol Usage

OM-____ - Date, safety_ihtm 2010-03



DANGER! – Indicates a hazardous situation which, if not avoided, will result in death or serious injury. The possible hazards are shown in the adjoining symbols or explained in the text.



Indicates a hazardous situation which, if not avoided, could result in death or serious injury. The possible hazards are shown in the adjoining symbols or explained in the text.

NOTICE – Indicates statements not related to personal injury.

8-2. Servicing Hazards

⚠ The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard.

⚠ Only qualified persons should service, test, maintain, and repair this unit.

⚠ During servicing, keep everybody, especially children, away.

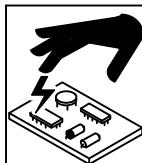


ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Turn Off induction heating power source and disconnect and lockout input power using line disconnect switch, circuit breakers, or by removing plug from receptacle, or stop engine before servicing unless the procedure specifically requires an energized unit.
- Insulate yourself from ground by standing or working on dry insulating mats big enough to prevent contact with the ground.
- Do not leave live unit unattended.
- If this procedure requires an energized unit, have only personnel familiar with and following standard safety practices do the job.
- When testing a live unit, use the one-hand method. Do not put both hands inside unit. Keep one hand free.
- Disconnect input power conductors from deenergized supply line BEFORE moving an induction heating power source.

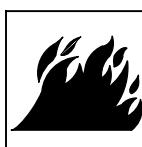
SIGNIFICANT DC VOLTAGE exists in inverter power sources AFTER removal of input power.

- Turn Off inverter, disconnect input power, and discharge input capacitors according to instructions in Troubleshooting Section before touching any parts.



STATIC (ESD) can damage PC boards.

- Put on grounded wrist strap BEFORE handling boards or parts.
- Use proper static-proof bags and boxes to store, move, or ship PC boards.



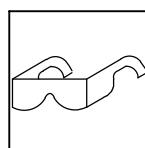
FIRE OR EXPLOSION hazard.

- Do not place unit on, over, or near combustible surfaces.
- Do not service unit near flammables.

Indicates special instructions.



This group of symbols means Warning! Watch Out! ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.



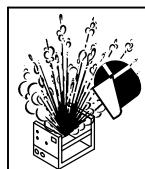
FLYING METAL or DIRT can injure eyes.

- Wear safety glasses with side shields or face shield during servicing.
- Be careful not to short metal tools, parts, or wires together during testing and servicing.



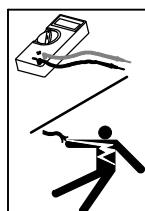
INDUCTION HEATING can burn.

- Do not touch hot parts bare handed.
- Allow cooling period before handling parts on equipment.
- Do not touch or handle induction head/coil during operation.
- Keep metal jewelry and other metal personal items away from head/coil during operation.
- To handle hot parts, use proper tools and/or wear heavy, insulated welding gloves and clothing to prevent burns.



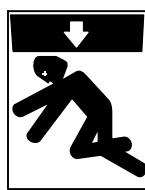
EXPLODING PARTS can injure.

- Failed parts can explode or cause other parts to explode when power is applied to inverters.
- Always wear a face shield and long sleeves when servicing inverters.



SHOCK HAZARD from testing.

- Turn Off induction heating power source before making or changing meter lead connections.
- Use at least one meter lead that has a self-retaining spring clip such as an alligator clip.
- Read instructions for test equipment.



FALLING EQUIPMENT can injure.

- Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
- Use equipment of adequate capacity to lift and support unit.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.
- Follow the guidelines in the Applications Manual for the Revised NIOSH Lifting Equation (Publication No. 94-110) when manually lifting heavy parts or equipment.



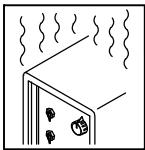
MOVING PARTS can injure.

- Keep away from moving parts such as fans.
- Have only qualified persons remove doors, panels, covers, or guards for maintenance and troubleshooting as necessary.
- Keep hands, hair, loose clothing, and tools away from moving parts.
- Reinstall doors, panels, covers, or guards when maintenance is finished and before reconnecting input power.



ELECTRIC AND MAGNETIC FIELDS (EMF) can affect Implanted Medical Devices.

- Wearers of Pacemakers and other Implanted Medical Devices should keep away from servicing areas until consulting their doctor and the device manufacturer.

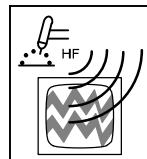


OVERUSE can cause OVERHEATING.

- Allow cooling period; follow rated duty cycle.
- Reduce current or reduce duty cycle before using induction heating equipment again.
- Do not block or filter airflow to unit.

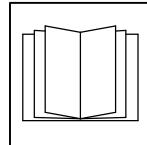
8-3. California Proposition 65 Warnings

- ⚠ Welding or cutting equipment produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)
- ⚠ Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling.
- ⚠ This product contains chemicals, including lead, known to the state of California to cause cancer, birth defects, or other reproductive harm. Wash hands after use.



H.F. RADIATION can cause interference.

- High-frequency (H.F.) can interfere with radio navigation, safety services, computers, and communications equipment.
- Have only qualified persons familiar with electronic equipment install, test, and service H.F. producing units.
- The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- If notified by the FCC about interference, stop using the equipment at once.
- Have the installation regularly checked and maintained.
- Keep high-frequency source doors and panels tightly shut, keep spark gaps at correct setting, and use grounding and shielding to minimize the possibility of interference.



READ INSTRUCTIONS.

- Use Testing Booklet (Part No. 150 853) when servicing this unit.
- Consult the Owner's Manual for welding safety precautions.
- Use only genuine replacement parts from the manufacturer.
- Read and follow all labels and the Technical Manual carefully before installing, operating, or servicing unit. Read the safety information at the beginning of the manual and in each section.

For Gasoline Engines:

- ⚠ Engine exhaust contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

For Diesel Engines:

- ⚠ Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

8-4. EMF Information

Electric current flowing through any conductor causes localized electric and magnetic fields (EMF). Welding current creates an EMF field around the welding circuit and welding equipment. EMF fields may interfere with some medical implants, e.g. pacemakers. Protective measures for persons wearing medical implants have to be taken. For example, access restrictions for passers-by or individual risk assessment for welders. All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:

1. Keep cables close together by twisting or taping them, or using a cable cover.
2. Do not place your body between welding cables. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.

4. Keep head and trunk as far away from the equipment in the welding circuit as possible.
5. Connect work clamp to workpiece as close to the weld as possible.
6. Do not work next to, sit or lean on the welding power source.
7. Do not weld whilst carrying the welding power source or wire feeder.

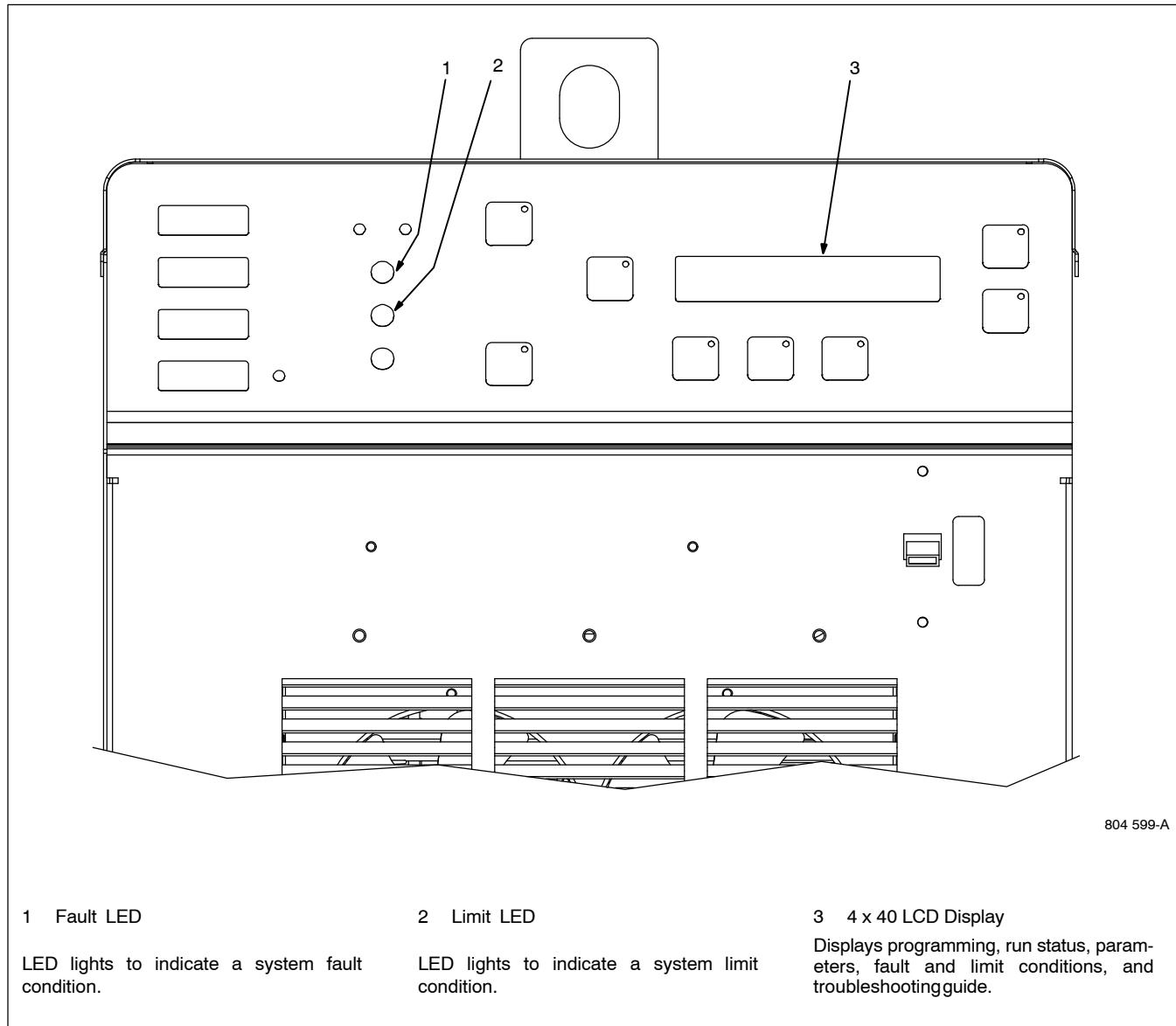
About Implanted Medical Devices:

Implanted Medical Device wearers should consult their doctor and the device manufacturer before performing or going near arc welding, spot welding, gouging, plasma arc cutting, or induction heating operations. If cleared by your doctor, then following the above procedures is recommended.

SECTION 9 – DIAGNOSTICS & TROUBLESHOOTING

The Toccotron AC power source has on-board capabilities to aid in troubleshooting problems should any conditions occur during operation. This troubleshooting capability consists of the Fault LED, Limit LED, and message screens that appear on the front panel LCD display.

9-1. Operator Interface Indicators



9-2. Limit Conditions

A limit condition indicates that the system is outside the range of its optimum operating conditions or parameters. Should a limit condition occur during operation, the yellow Limit LED will flash to indicate a problem. If the active screen on the LCD display is Run Status or Parameters, a message describing the particular limit condition will appear on the display. If the active screen is Program, press the Run Status  button to display the limit condition.

In a limit condition, the power source will continue to deliver output power and protect itself from damage by reducing the output power. This situation allows the operator time to determine the best action to correct the problem as described by the limit message on the LCD display.

If a limit condition occurs, there are two selectable options:

- Acknowledge the limit and continue operation.
- Terminate operation to correct the problem causing the limit.

Pressing the Decrease  button will acknowledge the limit and continue operation with the existing setup. In the acknowledge state, the yellow Limit LED will stop flashing and remain on continuously. The LCD display will revert to an active screen once the Program

 button, Run Status

button, or Parameters  button is pressed.

If a new limit condition should occur after the first is acknowledged, the yellow Limit LED will start flashing to indicate a new problem. To display the limit condition, press the Run Status  button and the LCD display will show a message describing the new and previous limit messages.

To obtain additional information regarding the limit condition and suggested solutions to resolve the limit, press the Increase  button, and the LCD display will indicate possible solutions based on the type of limit condition.

If the operator determines that the best course of action is to terminate operation and make suggested changes to the setup to eliminate the limit condition, press the Stop  button. After changes are made to the setup, press the Run  button to restart the process.

9-3. Limit Condition Codes

Limit Condition	Additional Information
L07: Output Voltage Limit	Tighten blanket against pipe surface
L08: Output Voltage Limit	Increase number of turns Increase coil space Shorten extension cable Increase insulation width
L09: Output Current Limit	Tighten blanket against pipe surface
L10: Output Current Limit	Increase number of turns Decrease coil space Tighten cable on insulation
L12: Power Source Overtemp Limit	Check for blocked vents Clean wind tunnel heat sinks

9-4. Fault Conditions

A fault condition occurs if the system encounters an isolation fault, encounters operating conditions outside operational limits, or if there is a serious problem with the system. Should a fault condition occur, the output is immediately turned off, the red Fault LED flashes and the Stop  button

LED flashes. If the active screen on the LCD display is Run Status or Parameters, a message describing the particular fault condition will appear on the

display. If the active screen is Program, press the Run Status  button to display the fault condition.

Pressing the Decrease  button will acknowledge the fault and the red Fault LED will stop flashing and remain on continuously. However, the

Stop  button LED will continue to flash indicating that the process has stopped.

To obtain additional information regarding the fault condition and suggested solutions to resolve the fault, press the Increase  button, and the LCD display will indicate possible solutions based on the type of fault condition. In most cases, a fault condition will indicate that service is required.

9-5. Fault Condition Codes

Fault Condition	Additional Information
F58: Output Voltage Fault	Service required
F59: Output Current Fault	Service required

Fault Condition	Additional Information
F62: Isolation Fault	Check for exposed conductor Clean for moisture on cables
F63: Line Voltage Fault	Check line voltage
F64: Power Source Overtemp Fault	Verify power source vents and wind tunnel are unobstructed
F65: Current Source Fault	Service required
F66: Under Frequency Fault	Check for loose or open connections in output cable Decrease number of turns Decrease coil space
F67: Over Frequency Fault	Verify heating cable properly wrapped Verify material being heated is magnetic
F70: Internal Communication Fault	Service required
F71: Internal Thermistor Fault	Service required
F73: Decoupled/Open Coil	Service required
F74: Isolation Fault Self-Test Error	Service required
F75: Internal Power Supply Fault	Service required
F76: Current Source Control Fault	Service required
F77: Power Source Internal Comm Fault	Service required
F78: Output Current Sense Fault	Check for loose/open output connection

9-6. System Diagnostic Screens

Additional system diagnostics are available and accessible through the operator interface. Detail operational parameters can be accessed by pressing and holding the Run Status  button and pressing the Parameters  button.

When this feature is initially activated, the following screen appears on the LCD display:

RemCmd: 1023 Off	DIAG1
OutI1: 0 A	
OutI2: 0 A	
IsrcFb: 0 A	

RemCmd – This is the value of the remote command and the status of the remote contactor.

Out I1 – This is the value of the tank current.

Out I2 – Not Used.

Isrc FB – This is the value of the amperage in the current source inverter.

The second diagnostic screen is available by again pressing and holding the Run Status  button and pressing the Parameters  button.

VLnA-B: 460V	Therm1: 77	DIAG2
VLnB-C: 460V	Therm2: 77	Therm5: OPEN
VLnC-A: 460V	Therm3: 77	
VBus: 650V	Therm4: OPEN	ExtInt: Off

VLnA-B – This is the approximate phase to phase line voltage between phases A and B.

VLnB-C – This is the approximate phase to phase line voltage between phases B and C.

VLnC-A – This is the approximate phase to phase line voltage between phases C and A.

VBus – This is the DC bus voltage.

Therm1 – This is the temperature of the current source primary heatsink.

Therm2 – This is the temperature of the bridge heatsink.

Therm3 – This is the temperature of the current source secondary heatsink.

Therm4 – Open (not used).

Therm5 – Open (not used).

ExtInt – This is the status of the relay contacts for a remote protection device..

- OFF
- ON

The third diagnostic screen is available by again pressing and holding the Run Status  button and pressing the Parameters  button.

This screen displays the values of cycles and running time. Cycle Counts and Run-Time can be reset to zero (0). Lifetime Cycles and Lifetime Run-Time values cannot be reset.

Cycle Counts.....:	0	CYCLES
Lifetime Cycles...:	0	
Run-Time.....:	0d 0h 0m 0.0s	
Lifetime Run-Time:	0d 0h 0m 0.0s	

Press the Increase  or Decrease  button simultaneously to reset Cycle Counts and Run-Time.

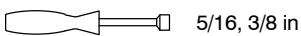
Press Program
to reset cycle counts

Press the Program  button and the cycle counts and run time will be reset to zero (0).

9-7. Removing Wrapper and Measuring Input Capacitor Voltage



Tools Needed:



5/16, 3/8 in

⚠ 900 Volts dc can be present on the capacitor bus and significant DC voltage can remain on capacitors after unit is Off. Always check the voltage on inverter assembly as shown to be sure the input capacitors have discharged before working on unit.

⚠ Turn Off welding power source, and disconnect input power.

⚠ Significant DC voltage can remain on capacitors after unit is Off. Always check the voltage as shown to be sure the input capacitors have discharged before working on unit.

Remove right side panel and disconnect fan motor FM3.

1 Current Source Interconnect Board PC4

2 Voltmeter

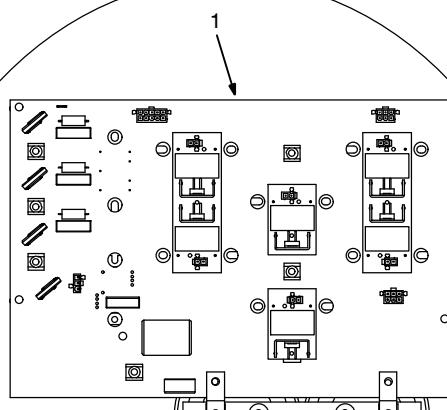
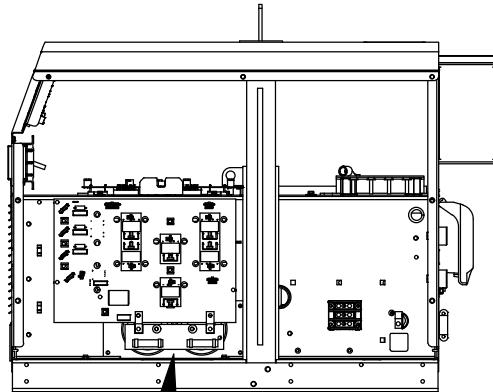
Measure the dc voltage across the + bus terminal and - bus terminal on PC4 as shown until voltage drops to near 0 (zero) volts.

☞ If the capacitor voltage does not drop to near zero after several minutes, use a bleeder resistor of between 200 and 500 ohms, at least 10 watts, and #16 AWG 600 volts ac insulation rated wire to discharge the capacitor(s).

3 Typical Bleeder Resistor

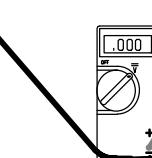
An example of a typical bleeder resistor is shown on this page.

Proceed with job inside unit. Reconnect FM3 and reinstall right side panel when finished.



+ lead to right bus terminal,
- lead to left bus terminal

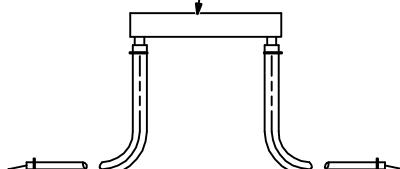
1



2

3

Typical Bleeder Resistor
200 to 500 ohm, 10 watt
wire wound resistor



#16 AWG 600 Volts AC
Insulation Rating

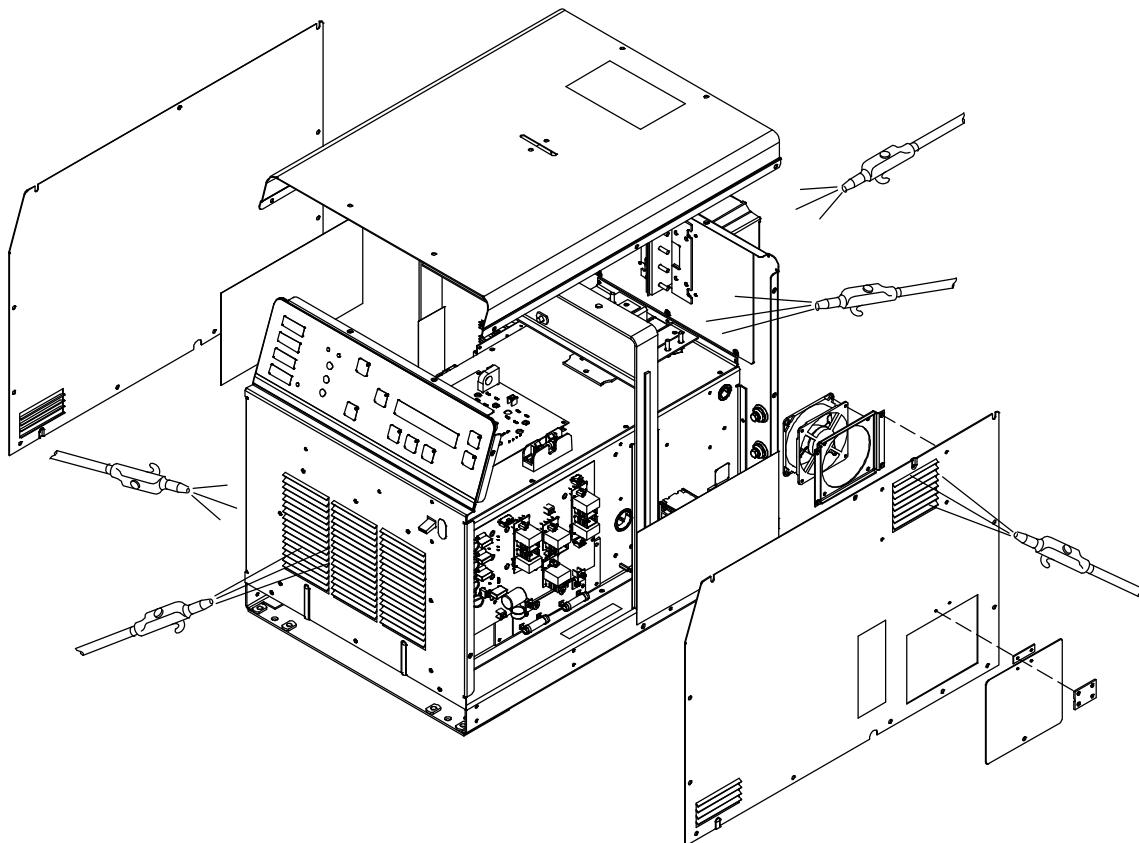
9-8. Blowing Out Inside Of Unit



⚠ Turn Off welding power source and disconnect input power.

⚠ Remove wrapper and be sure input capacitors are discharged.

Blow out inside of unit. Blow out fan motors in right side panel and front panel.



804 601-B

SECTION 10 – ELECTRICAL DIAGRAM

⚠ WARNING



ELECTRIC SHOCK HAZARD

- Do not touch live electrical parts.
- Disconnect input power or stop engine before servicing.
- Do not operate with covers removed.
- Have only qualified persons install, use, or service this unit.

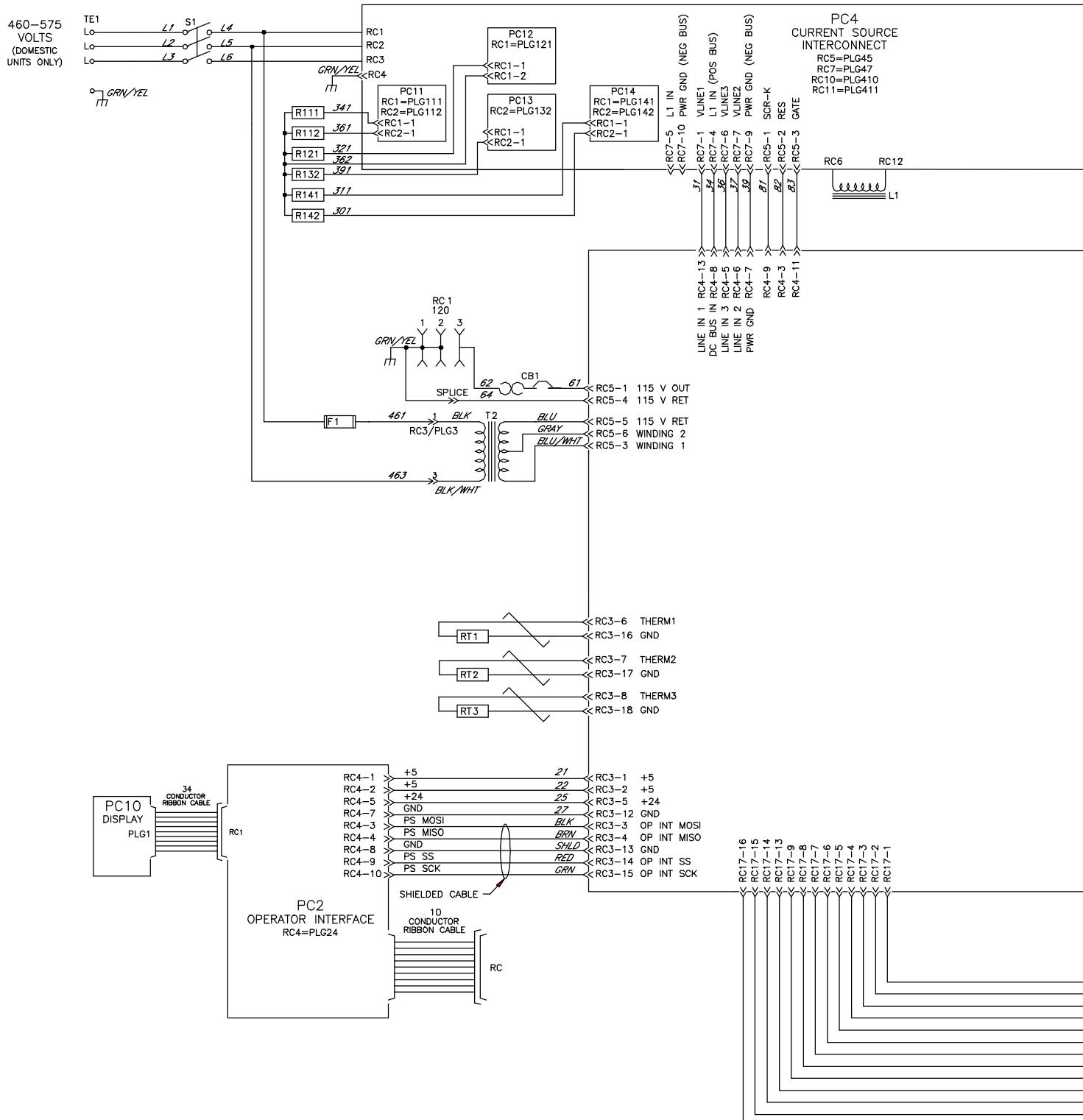
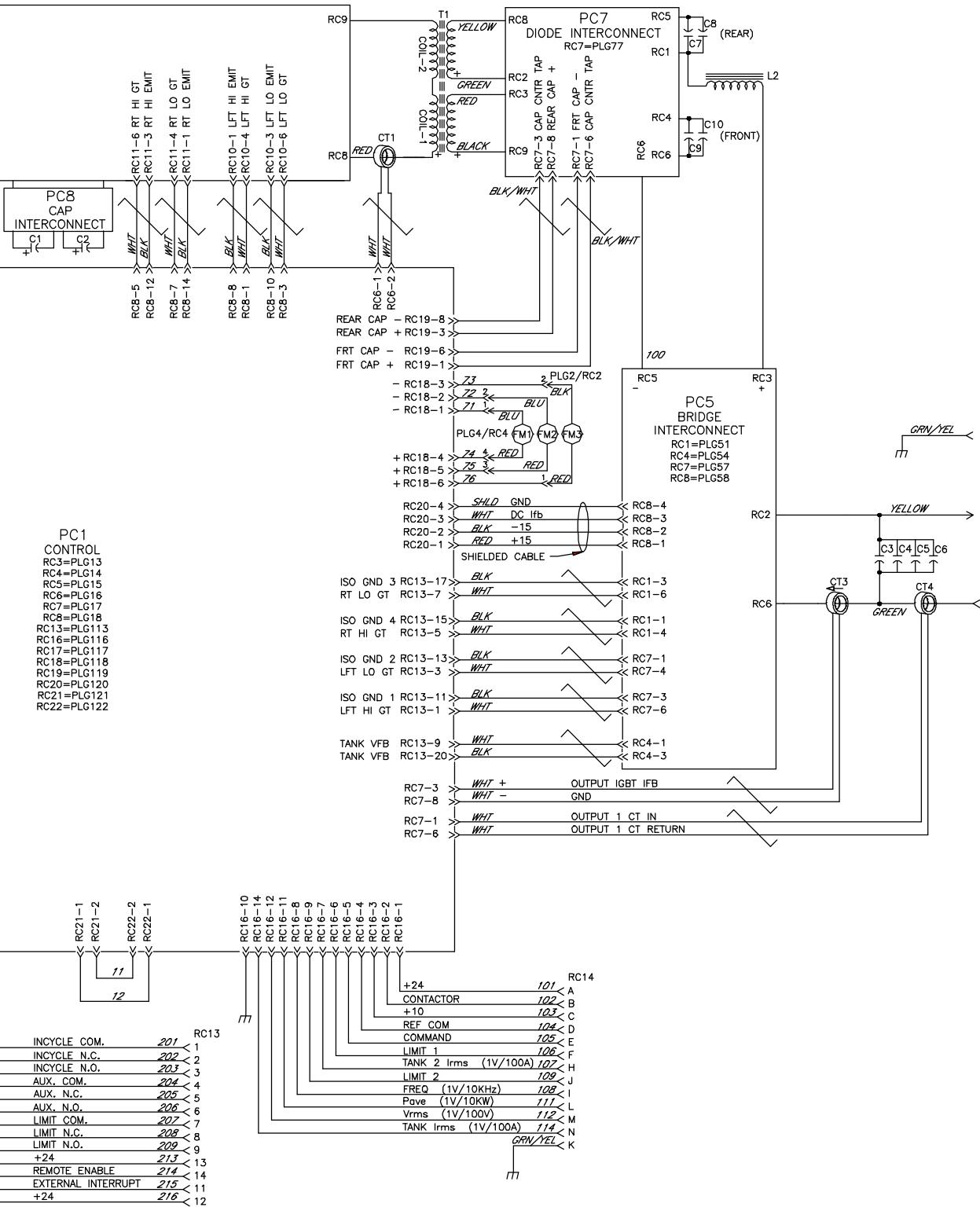


Figure 10-1. Circuit Diagram



SECTION 11 – PARTS LIST

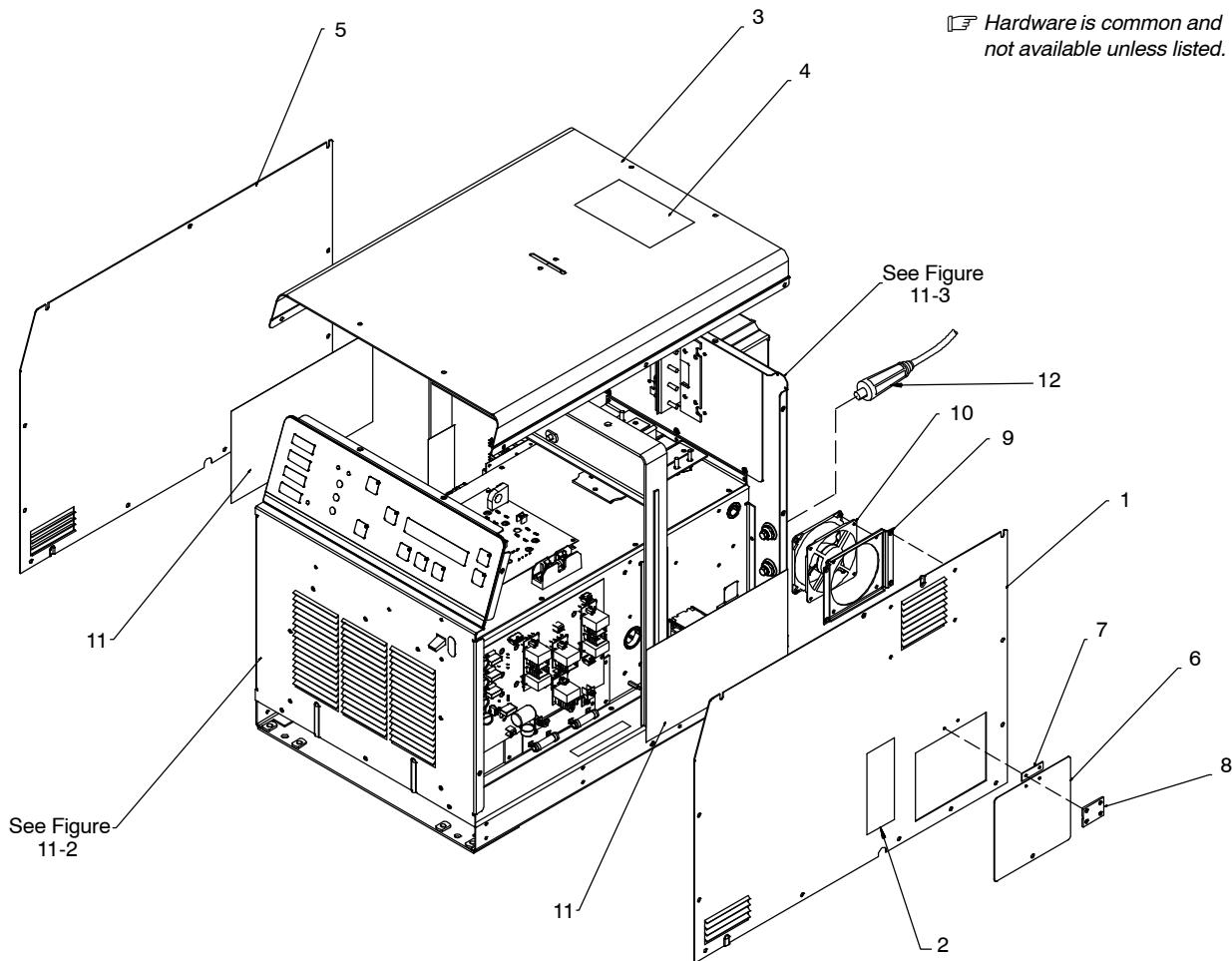


Figure 11-1. Wrappers

804 601-B

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
----------	---------------	----------	-------------	----------

Figure 11-1. Wrappers

... 1	+217 470 ..	PANEL, side RH	1
... 2	217 860 ..	LABEL, warning electric shock and input pwr (FR)	1
... 3	+217 325 ..	COVER, top	1
... 4	147 876 ..	LABEL, warning general precautionary induction heat	1
... 5	217 334 ..	PANEL, side LH	1
... 6	217 468 ..	DOOR, primary board	1
... 7	189 491 ..	SPACER, hinge	1
... 8	168 343 ..	HINGE, cont polyolefin copolymer	1
... 9	222 106 ..	BRACKET, mtg fan	1
... 10 ..	FM3	FAN, muffin 24VDC 3000 RPM 130 CFM	1
... 11	206 270 ..	INSULATOR, side RH	2
... 12	127 836 ..	PLUG, tw lk insul male	1
.....	RC2	HOUSING PLUG+PINS,(SERVICE KIT)	1
.....	PLG2	HOUSING RCPT+SKTS,(SERVICE KIT)	1

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

*Recommended Spare Parts.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Hardware is common and
not available unless listed.

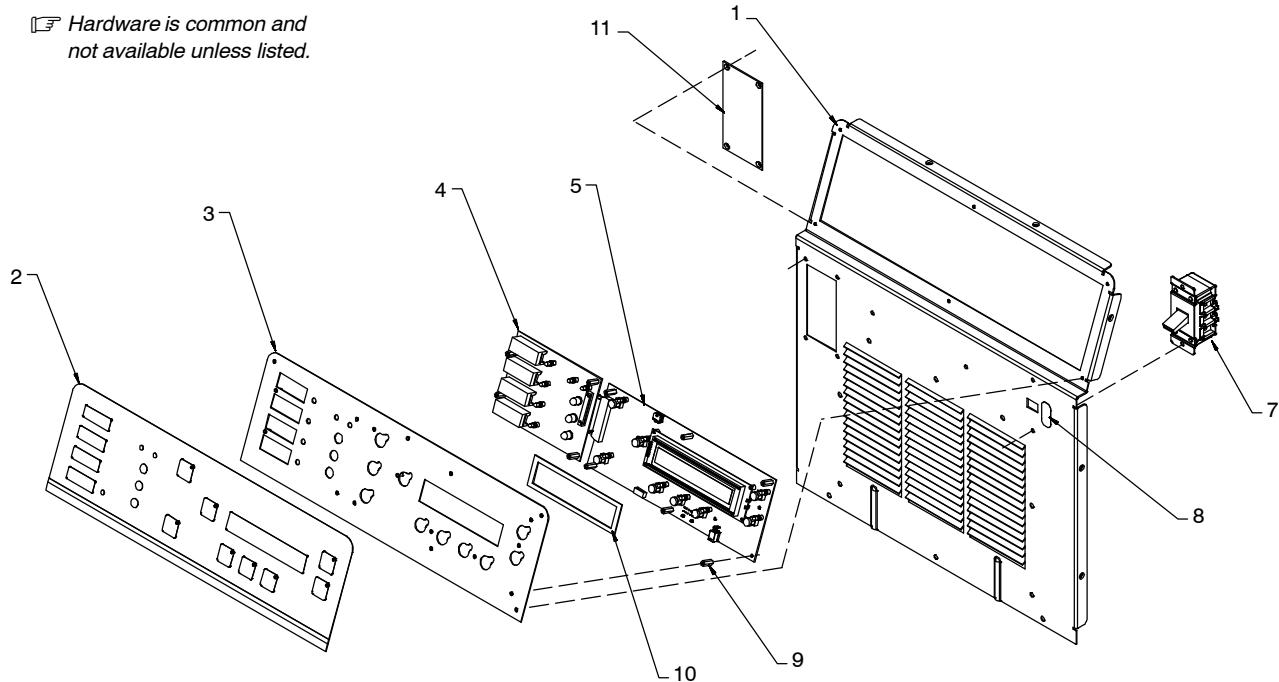


Figure 11-2. Front Panel

804 602-B

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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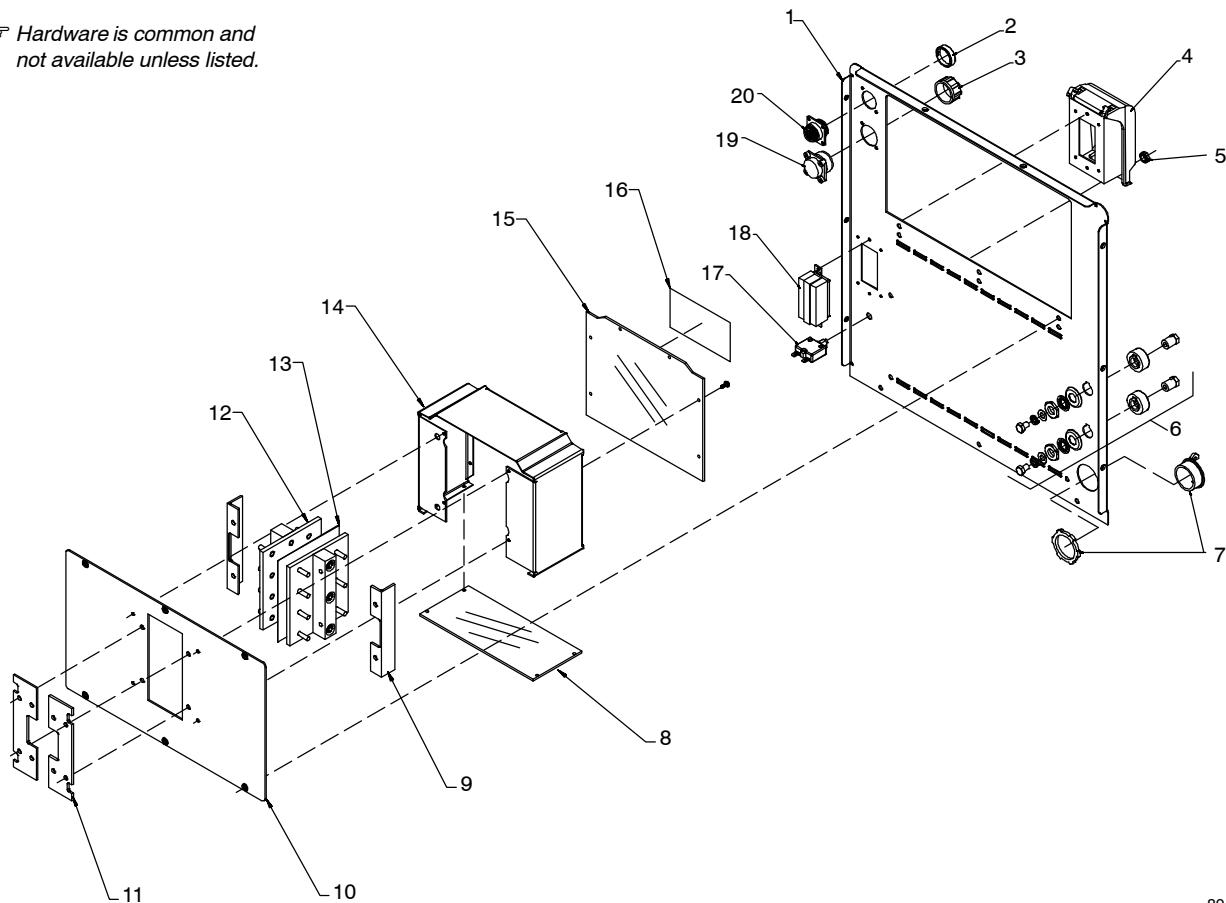
Figure 11-2. Front Panel

.... 1	217 323 ..	PANEL, front	1
.... 2		NAMEPLATE (Order By Model And Serial Number)	1
.... 3	216 224 ..	PANEL, operator interface	1
.... 4 ..	PC10	CIRCUIT CARD ASSY, display	1
.... 5 ..	PC2	CIRCUIT CARD ASSY, operator interface	1
.... 7 ..	S1	SWITCH, tgl 3pst 40A 600VAC SCR Term Wide TGL	1
.... 8	252 731 ..	LABEL, warning read labels on/off storage temp	1
.... 9	115 440 ..	STANDOFF, no 6-32	14
.... 10	224 143 ..	GASKET, meter lens	1
.... 11	228 168 ..	PLATE, TC receptacle blank	1
..... PLG24	115 091 ..	HOUSING PLUG+SKTS, (SERVICE KIT)	1
..... CT1	220 821 ..	XFMR, current primary	1
..... CT3	220 822 ..	XFMR, current bridge	1
..... CT4	220 823 ..	XFMR, current output	1

*Recommended Spare Parts.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Hardware is common and
not available unless listed.



804 603-A

Figure 11-3. Rear Panel

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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Figure 11-3. Rear Panel

... 1	217 324 ..	PANEL, rear		1
... 2	224 042 ..	CONNECTOR, circ CPC protective cap		1
... 3	170 391 ..	CONNECTOR, circ MS protective cap		1
... 4	220 824 ..	COVER, receptacle weatherproof duplex		1
... 5	147 195 ..	NUT, 375-27 .54 hex .25 H nyl		1
... 6	127 837 ..	RECEPTACLE, tw lk insul fem (dinse type)	2	
... 7	010 467 ..	CONNECTOR, clamp cable 1.250		1
... 8	196 247 ..	ENDPLATE, output enclosure bottom		1
... 9	192 515 ..	BRACKET, mtg output block	2	
... 10	228 169 ..	PANEL, rear output		1
... 11	186 523 ..	STRIP, mtg output assy	2	
... 12	218 693 ..	ASSY, output plate	2	
... 13	229 153 ..	INSULATOR, output TOCCOTRON AC		1
... 14	196 245 ..	ENCLOSURE, output		1
... 15	+196 246 ..	ENDPLATE, output enclosure		1
... 16	602 498 ..	LABEL, danger high voltage 2 1/4 x 4		1
... 17 ..	CB1	SUPPLEMENTARY PROTECTOR, man reset 1P 2.5 A 250 VAC		1
... 18 ..	RC1	RECEPTACLE, w/leads		1
... 19 ..	RC14	RCPT W/SKTS, (service kit)		1
... 20 ..	RC9	HOUSING PLUG+PINS, (service kit)		1

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

*Recommended Spare Parts.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Hardware is common and
not available unless listed.

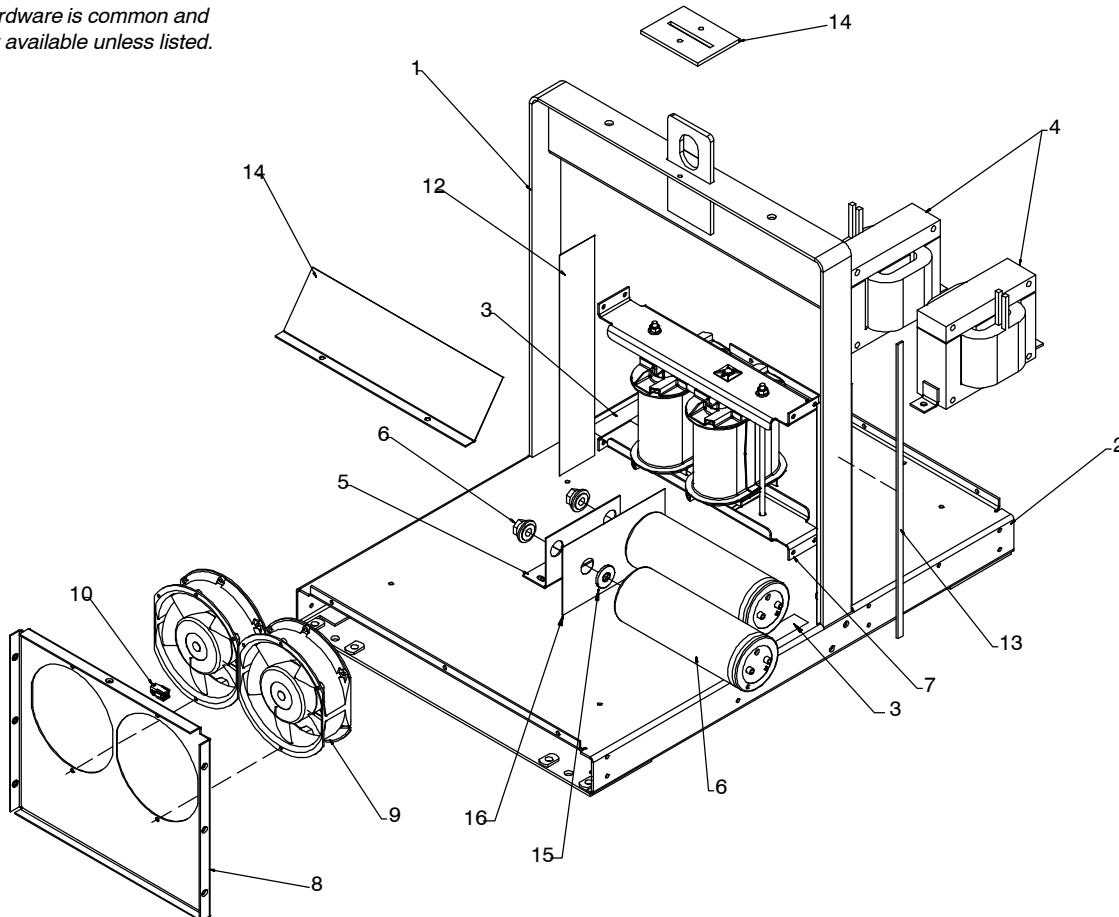


Figure 11-4. Base w/Components

804 221-D

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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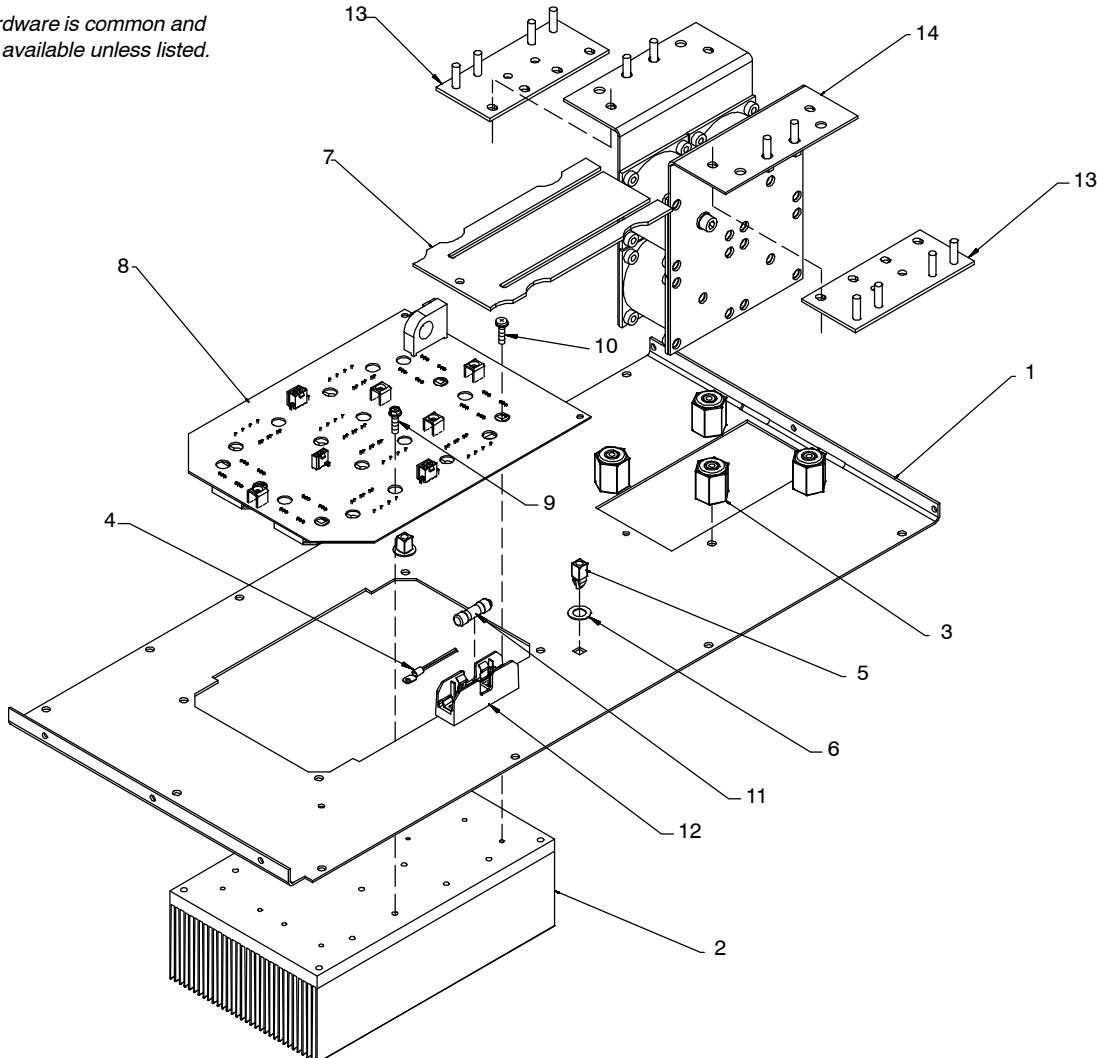
Figure 11-4. Base w/Components

... 1	217 328 ..	FRAME, lifting		1
... 2	213 865 ..	BASE ASSY		1
... 3	213 939 ..	LABEL, warning electric shock can kill significant		2
... 4 .. L1,L2 ..	218 692 ..	INDUCTOR		2
... 5	216 815 ..	BRACKET, cap support		1
... 6 .. C1,2 ..	213 870 ..	CAPACITOR, elctlt		2
... 7 .. T1 ..	213 583 ..	TRANSFORMER, hf		1
... 7 .. T1 ..	227 065 ..	TRANSFORMER, hf (400V model)		1
... 8	216 629 ..	BRACKET, fan		1
... 9 .. FM1,FM2 ..	222 728 ..	FAN, nuffin 48 V		2
... 10 .. RC4 ..	115 090 ..	HOUSING PLUG+PINS, (service kit)		1
... 11	217 992 ..	BAFFLE, air bottom		1
... 12	224 973 ..	INSULATOR, lift frame		2
... 13	603 115 ..	WEATHERSTRIPPING		2
... 14	026 627 ..	GASKET, lifting eye cover		1
..... PLG4	115 094 ..	HOUSING PLUG+SKTS,(SERVICE KIT)		1
... 15	226 837 ..	WASHER, rubber .343 id x .875 od x .093 thk		2
... 16	226 838 ..	INSULATOR, capacitor		1

*Recommended Spare Parts.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Hardware is common and
not available unless listed.



804 604-B

Figure 11-5. Top Windtunnel

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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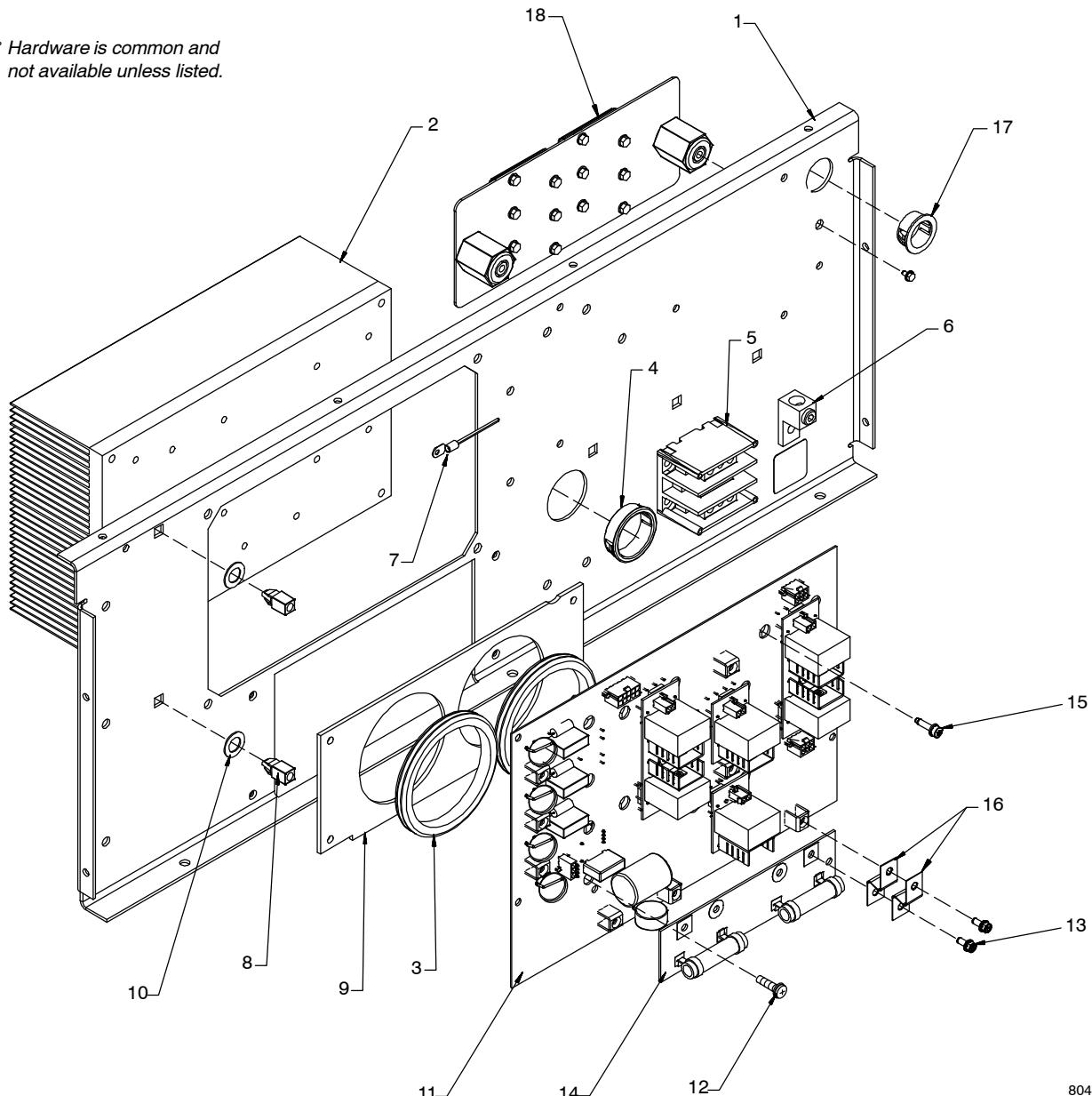
Figure 11-5. Top Windtunnel

..... 1	218 424 ..	WINDTUNNEL, top	1
..... 2	218 684 ..	HEAT SINK, AC commutator	1
..... 3	025 248 ..	STANDOFF, insul .250-20 x 1.250 lg x .437 thd	4
..... 4	RT2	THERMISTOR, ntc 30 k ohm at 25 deg C 24 in lead	1
..... 5	083 147 ..	GROMMET, scr no 8/10 panel hole .312 sq .500 high	2
..... 6	605 339 ..	WASHER, TOOTH .377 ID X 0.507 OD X .022T stl pld	2
..... 7	250 975 ..	INSULATOR, tank cap	1
..... 8	PC5	KIT, circuit card assy intrcnct bridge	1
..... 9	208 591 ..	SCREW, M 5- .8X 12 soc hd-torx stl pld sems	12
..... 10	212 038 ..	SCREW, M4 - .7 x 8.5 pan hd-phl stl pld	8
..... 11	F1	FUSE, crtg 2. amp 600 V time delay	1
..... 12	225 553 ..	HOLDER, fuse crtg 30 A 600 V 13/32 X 1-1/2 LG	1
..... 13	229 509 ..	EXTENSION, adapter tank capacitor	2
..... PLG32	115 091 ..	HOUSING PLUG+SKTS,(SERVICE KIT)	1
..... PLG51,57	115 093 ..	HOUSING PLUG+SKTS,(SERVICE KIT)	2
..... PLG58	115 094 ..	HOUSING PLUG+SKTS,(SERVICE KIT)	1
..... 227 082 ..	CHOKE, common mode (400 V model only)	1	
..... 14	251 158 ..	Cap Assy	1

*Recommended Spare Parts.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Hardware is common and
not available unless listed.



804 605-B

Figure 11-6. Right Windtunnel

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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Figure 11-6. Right Windtunnel

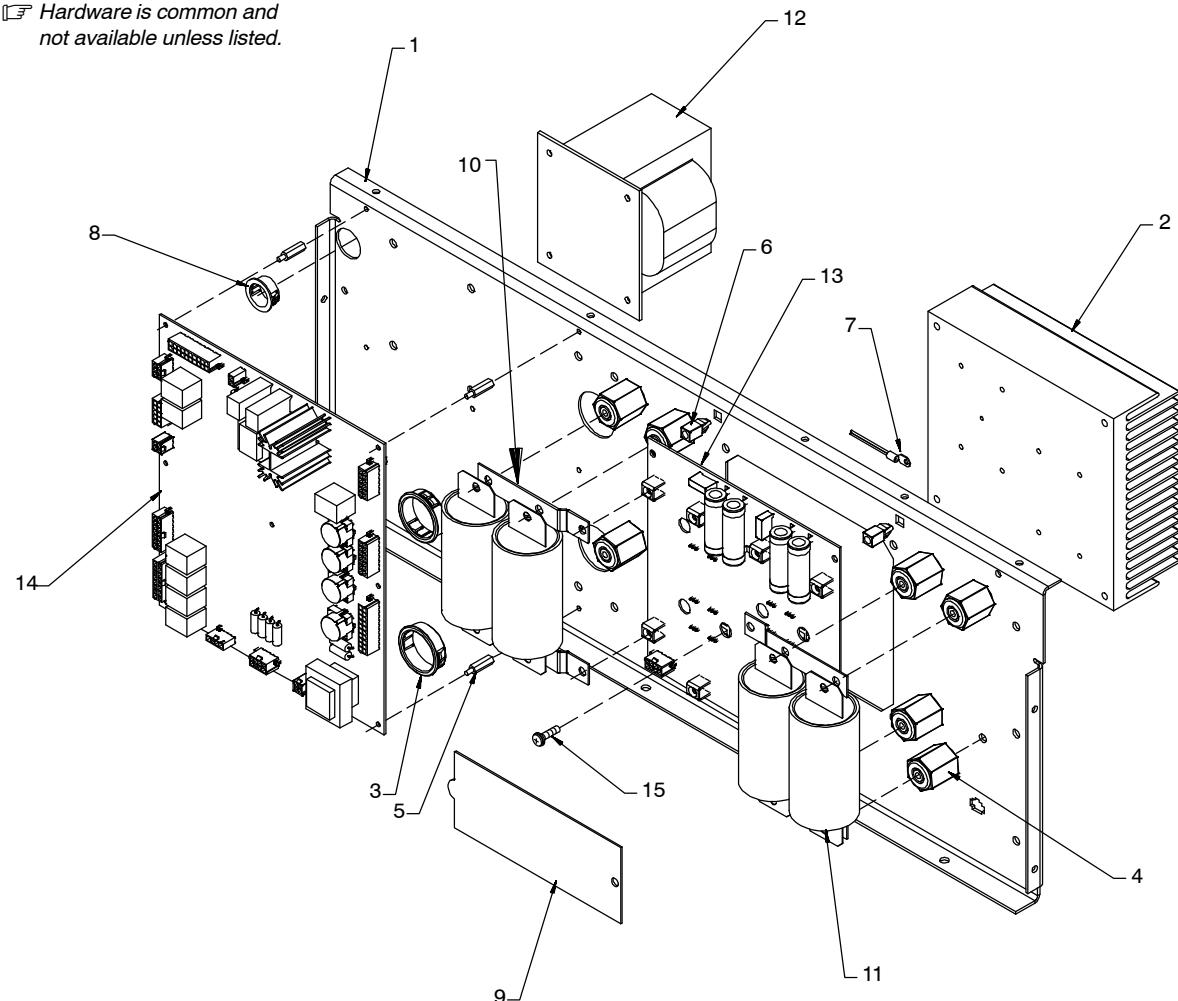
... 1	216 630 ..	WINDTUNNEL, RH	1
... 2	213 873 ..	HEAT SINK, current source	1
... 3	213 871 ..	GROMMET, rbr sil 3.000 ID x 3.250 mtg hole	2
... 4	170 647 ..	BUSHING, snap-in nyl 1.312 ID x 1.500 mtg hole	1
... 5	223 120 ..	BLOCK, term 115 amp 3 pole screw term	1
... 6	148 743 ..	LUG, univ w/scr 600V 2-14 wire .250 stud	1
... 7	RT1	THERMISTOR, ntc 30 k ohm at 25 deg C 34 in lead	1
... 8	083 147 ..	GROMMET, scr no 8/10 panel hole .312 sq .500 high	2
... 9	224 391 ..	PANEL, insulating mtg capacitor	1
... 10	605 339 ..	WASHER, TOOTH .377 ID X 0.507 OD X .022T stl pld	2
... 11	PC4	KIT, circuit card assy intrcnct I srce inpt	1
... 12	212 038 ..	SCREW, M4 - .7 x 8.5 pan hd-phl stl pld	2
... 13	176 879 ..	SCREW, M5 - .8 x 12 hex hd-phl 8.8 pld	12
... 14	PC8	CIRCUIT CARD ASSY, bus intrcnct	1
... 15	208 591 ..	SCREW, M 5- .8X 12 soc hd-torx stl pld sems	14

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure 11-6. Right Windtunnel (Continued)				
.... 16	229 728 ..	STRAP, connecting		4
.... 17	030 170 ..	BUSHING, snap-in nyl .750 id x 1.000 mtg hole		1
.... 18	231 050 ..	ASSY, resistor		1
..... PLG64,410,				
411	115 093 ..	HOUSING PLUG+SKTS,(SERVICE KIT)		3
..... PLG47	115 091 ..	HOUSING PLUG+SKTS,(SERVICE KIT)		1
..... PLG45,61 ..	131 204 ..	HOUSING PLUG+SKTS,(SERVICE KIT)		2
..... PLG111, 112				
121, 132,				
141, 142 ..	131 054 ..	HOUSING RCPT+SKTS, (SERVICE KIT)		6

*Recommended Spare Parts.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Hardware is common and
not available unless listed.



804 225-A

Figure 11-7. Left Windtunnel

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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Figure 11-7. Left Windtunnel

... 1	216 631 ..	WINDTUNNEL, LH	1
... 2	218 683 ..	HEAT SINK, diode	1
... 3	170 647 ..	BUSHING, snap-in nyl 1.312 ID x 1.500 mtg hole	2
... 4	025 248 ..	STAND-OFF, insul .250-20 x 1.250 lg x .437 thd	8
... 5	115 443 ..	STAND-OFF, no 6-32 x .750 lg .250 hex	7
... 6	083 147 ..	GROMMET, scr no 8/10 panel hole .312 sq .500 high	2
... 7	RT3	THERMISTOR, ntc 30 k ohm at 25 deg C 24 in lead	1
... 8	030 170 ..	BUSHING, snap-in nyl .750 ID x 1.000 mtg hole	1
... 9	218 430 ..	COVER, access	1
... 10	220 825 ..	BUS BAR, capacitor	4
... 11	C7-C10 ..	CAPACITOR, polyp film 1.35 uf 700 VAC +5% -0%	4
... 11	C7-C10 ..	CAPACITOR, polyp film 1.10 uf 700 vac +5% -0% (400 V model only)	4
... 12	T2	TRANSFORMER, control	1
... 13	PC7	KIT, circuit card assy intrcnct l srce out	1
... 14	PC1	CIRCUIT CARD ASSY, ps control w/program	1
... 15	212 038 ..	SCREW, M4 - .7 x 8.5 pan hd-phl stl pld slffmg	8

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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Figure 11-7. Left Windtunnel (Continued)

.....	PLG16,			
	121,122 ...	131 054 ..	HOUSING RCPT+SKTS,(SERVICE KIT)	3
.....	PLG19,			
	120	115 094 ..	HOUSING PLUG+SKTS,(SERVICE KIT)	2
.....	PLG15,			
	118	115 093 ..	HOUSING PLUG+SKTS,(SERVICE KIT)	2
.....	PLG77,			
	119	115 092 ..	HOUSING PLUG+SKTS,(SERVICE KIT)	2
.....	PLG17			
	115 091 ..	HOUSING PLUG+SKTS,(SERVICE KIT)	1
.....	PLG18,			
	116	131 056 ..	HOUSING RCPT+SKTS,(SERVICE KIT)	2
.....	PLG13,			
	113	162 382 ..	HOUSING PLUG+SKTS,(SERVICE KIT)	2
.....	PLG14			
	130 203 ..	HOUSING PLUG+SKTS,(SERVICE KIT)	1

*Recommended Spare Parts.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Warranty

Effective January 1, 2011

(Equipment with a serial number preface of MB or newer)

This limited warranty supersedes all previous manufacturers warranties and is exclusive with no other guarantees or warranties expressed or implied.

LIMITED WARRANTY – Subject to the terms and conditions below, warrants to its original retail purchaser that new equipment sold after the effective date of this limited warranty is free of defects in material and workmanship at the time it is shipped from factory. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS.

Within the warranty periods listed below, manufacturer will repair or replace any warranted parts or components that fail due to such defects in material or workmanship. Manufacturer must be notified in writing within thirty (30) days of such defect or failure, at which time manufacturer will provide instructions on the warranty claim procedures to be followed.

Manufacturer shall honor warranty claims on warranted equipment listed below in the event of such a failure within the warranty time periods. All warranty time periods start on the delivery date of the equipment to the original end-user purchaser, and not to exceed one year after the equipment is shipped to the distributor.

1. 5 Years Parts — 3 Years Labor
 - * Original main power rectifiers only to include SCRs, diodes, and discrete rectifier modules
2. 3 Years — Parts and Labor
 - * Engine Driven Welding Generators
(NOTE: Engines are warranted separately by the engine manufacturer.)
 - * Inverter Power Sources (Unless Otherwise Stated)
 - * Plasma Arc Cutting Power Sources
 - * Process Controllers
 - * Semi-Automatic and Automatic Wire Feeders
 - * Smith 30 Series Flowgauge and Flowmeter Regulators (No Labor)
 - * Transformer/Rectifier Power Sources
 - * Water Coolant Systems (Integrated)
3. 2 Years — Parts
 - * Auto-Darkening Helmet Lenses (No Labor)
4. 1 Year — Parts and Labor Unless Specified
 - * Automatic Motion Devices
 - * CoolBelt and CoolBand Blower Unit (No Labor)
 - * External Monitoring Equipment and Sensors
 - * Field Options
(NOTE: Field options are covered for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
 - * Flowgauge and Flowmeter Regulators (No Labor)
 - * RFCS Foot Controls (Except RFCS-RJ45)
 - * Fume Extractors
 - * HF Units
 - * ICE Plasma Cutting Torches (No Labor)
 - * Induction Heating Power Sources, Coolers, and Electronic Controls/Recorders
 - * Load Banks
 - * Motor Driven Guns (w/exception of Spoolmate Spoolguns)
 - * PAPR Blower Unit (No Labor)
 - * Positioners and Controllers
 - * Racks
 - * Running Gear/Trailers
 - * Spot Welders
 - * Subarc Wire Drive Assemblies
 - * Water Coolant Systems (Non-Integrated)
 - * Weldcraft-Branded TIG Torches (No Labor)
 - * Wireless Remote Foot/Hand Controls and Receivers
 - * Work Stations/Weld Tables (No Labor)
5. 6 Months — Parts
 - * Batteries
 - * Bernard Guns (No Labor)
 - * Tregaskiss Guns (No Labor)

6. 90 Days — Parts
 - * Accessory Kits
 - * Canvas Covers
 - * Induction Heating Coils and Blankets, Cables, and Non-Electronic Controls
 - * M-Guns
 - * MIG Guns and Subarc (SAW) Guns
 - * Remote Controls and RFCS-RJ45
 - * Replacement Parts (No labor)
 - * Roughneck Guns
 - * Spoolmate Spoolguns

Limited Warranty shall not apply to:

1. Consumable components; such as contact tips, cutting nozzles, contactors, brushes, relays, work station table tops and welding curtains, or parts that fail due to normal wear. (Exception: brushes and relays are covered on all engine-driven products.)
2. Items furnished by manufacturer, but manufactured by others, such as engines or trade accessories. These items are covered by the manufacturer's warranty, if any.
3. Equipment that has been modified by any party other than manufacturer, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

MANUFACTURER'S PRODUCTS ARE INTENDED FOR PURCHASE AND USE BY COMMERCIAL/INDUSTRIAL USERS AND PERSONS TRAINED AND EXPERIENCED IN THE USE AND MAINTENANCE OF WELDING EQUIPMENT.

In the event of a warranty claim covered by this warranty, the exclusive remedies shall be, at manufacturer's option: (1) repair; or (2) replacement; or, where authorized in writing by manufacturer in appropriate cases, (3) the reasonable cost of repair or replacement at an authorized service station; or (4) payment of or credit for the purchase price (less reasonable depreciation based upon actual use) upon return of the goods at customer's risk and expense. Manufacturer's option of repair or replacement will be F.O.B. Factory at Appleton, Wisconsin, or F.O.B. at an authorized service facility as determined by manufacturer. Therefore no compensation or reimbursement for transportation costs of any kind will be allowed.

TO THE EXTENT PERMITTED BY LAW, THE REMEDIES PROVIDED HEREIN ARE THE SOLE AND EXCLUSIVE REMEDIES. IN NO EVENT SHALL MANUFACTURER BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFIT), WHETHER BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY.

ANY EXPRESS WARRANTY NOT PROVIDED HEREIN AND ANY IMPLIED WARRANTY, GUARANTY OR REPRESENTATION AS TO PERFORMANCE, AND ANY REMEDY FOR BREACH OF CONTRACT TORT OR ANY OTHER LEGAL THEORY WHICH, BUT FOR THIS PROVISION, MIGHT ARISE BY IMPLICATION, OPERATION OF LAW, CUSTOM OF TRADE OR COURSE OF DEALING, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE, WITH RESPECT TO ANY AND ALL EQUIPMENT FURNISHED BY MANUFACTURER IS EXCLUDED AND DISCLAIMED BY MANUFACTURER.

Some states in the U.S.A. do not allow limitations of how long an implied warranty lasts, or the exclusion of incidental, indirect, special or consequential damages, so the above limitation or exclusion may not apply to you. This warranty provides specific legal rights, and other rights may be available, but may vary from state to state.

In Canada, legislation in some provinces provides for certain additional warranties or remedies other than as stated herein, and to the extent that they may not be waived, the limitations and exclusions set out above may not apply. This Limited Warranty provides specific legal rights, and other rights may be available, but may vary from province to province.



Owner's Record

Please complete and retain with your personal records.

Model Name

Serial/Style Number

Purchase Date

(Date which equipment was delivered to original customer.)

Distributor

Address

City

State

Zip



Resources Available

Always provide Model Name and Serial/Style Number.

Contact your Distributor for:

Welding Supplies and Consumables
Options and Accessories
Personal Safety Equipment
Service and Repair
Replacement Parts
Owner's Manuals
Circuit Diagrams

Contact the Delivering Carrier to:

File a claim for loss or damage during shipment.

For assistance in filing or settling claims, contact your distributor and/or equipment manufacturer's Transportation Department.